FIELD CROP ABSTRACTS

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REVIEW ARTICLE

SOWING AND THINNING THE SUGAR-BEET CROP

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INTRODUCTION

In many districts in England and Scotland sugar-beet has become the pivotal crop in the farming enterprise, taking the place of the traditional fodder-root break in the arable rotation.

The beet crop, however, makes heavy demands on labour at harvest and in spring when the crop is thinned. Of these two peak periods, harvest can be spread over several months, and, in the last decade, improvement in harvester design and manufacture has made such strides that in 1957, more than half the total crop was lifted by machine. The present situation is that the labour of thinning the crop is the major problem facing the grower, although it is not yet as urgent in the preponderantly agricultural areas of the UK as it is in certain districts close to industrial centres, or in the USA, where shortage of labour has been a decisive factor from the outset and where the ideas described in the following sections for saving labour in the beet crop have been most widely adopted.

PLANT POPULATION AND YIELD

A great deal of work both in Europe and in the USA has been devoted to an examination of the effect of plant density and spacing between and within the rows. Much of this work was reviewed by Coons (11). All the evidence shows that the highest yields of roots are given by close spacings, both between rows and within the row. In the early history of the crop, when virtually the entire cultivation of the beet was by hand, very close spacings (40,000 roots per acre) were recommended, but after the first world war, following the introduction of horse-drawn drills and hoes, it was normal practice in European countries, where ample hand labour for harvest was still available, to aim at 30,000 plants per acre. This is still regarded as a desirable standard, but some compromise has been generally accepted in countries where shortage of labour has resulted in the widespread use of machine harvesters, and, more recently, of mechanical methods of thinning. Rows must be 20 or even 22 in. wide for a harvesting machine to work satisfactorily and although theoretically it is possible to reduce singling distance in the rows to maintain the 30,000 plants per acre, in practice it is difficult to leave so many plants in the row : moreover, as many investigators have shown (e.g. Garner and Sanders (24), Brewbaker and Deming (8), reducing the distance between plants in the row does not increase yield to nearly the same extent as narrowing the spacing between rows. In other words, the wider rows needed for machine-harvesting reduce yield (8), (24), (14) and this cannot be made good by leaving the plants closer than about 10–12 in. apart in the row. However, as the workers cited above emphasised, regularity of plant is of critical importance in determining yield at the levels of plant population which allow normal farming operations. The compensation through increased growth of the roots on either side of a gap where the plant is missing is very high but the percentage of compensation rapidly falls if the gap is larger. This helps to explain why, under conditions of adequate fertility and water supply, a crop grown at a row-spacing of 20 to 22 in. with 11–12 in. between plants in the row, i.e. about 26,000 plants per acre, is found to give a yield close to the maximum, provided that the distribution of these plants is regular. But having regard to the inevitable losses of plants during the season through disease or injury from inter-row cultivations, it is wise to aim at higher populations by reducing singling distances by an inch or so. Below this level of plant population an appreciable loss of yield is likely to occur and it is interesting to note that although the average sugar-beet-plant population in Great Britain has risen since the last war the last 5-yr. average for the country was barely 20,000 plants per acre (10); a general increase in levels of plant population above this figure would undoubtedly result in increased crop production.

SEED TREATMENT

MONOGERM SEED

The sugar-beet 'seed' is botanically a cluster normally containing from one to four true seeds embedded in a woody outer husk. A single cluster, therefore, produces several seedlings which develop into a closely entwined bunch and are difficult to separate when the time comes to single them. Any means of increasing the proportion of single seedlings in the braird gives the hoeman a better chance of finding a single plant standing alone in the

right place and enables him to cut out the superfluous seedlings fairly quickly however crowded they may be in the row. Thus even a relatively small increase in the proportion of clusters that produce single seedlings is an appreciable aid to the hoeman.

The ultimate solution of this problem may lie with the plant-breeder and this was early recognised in the USA, where the saving of hand-labour has always been regarded as of primary importance. Early in the century, Palmer (56) discussed the possibility of breeding single-germ beet seed and described methods for selecting the single-flower character but these methods did not prove successful. More recently Bordonos (6), Savitsky (62) (63), and other breeders in Russia and the USA have made great progress in the development of monogerm strains, but the fact that the single-germ character is evidently a recessive (9), increases the difficulty of combining this character with the desirable qualities of yield, disease resistance, etc., found in existing commercial strains. Nevertheless, one company in the USA has stated that 10,000 lb. of a commercial strain of monogerm seed were planted in 1957 and that limited quantities may be available to the farmer in 1958. From Russia, Orlovskiĭ (55) has recently reported good progress in raising the productivity of the monogerm strains bred in that country. Monogerm seed tends to be smaller and flatter in shape than normal seed but Kloor (37) reports that it can be sown in normal precision drills without difficulty. Pelleting has been suggested as a means of making the flat seed run more evenly in the drill (68) but other tests (37) have indicated that pelleting adversely affects emergence and this is the general experience with coated or pelleted seed of any type.

SEGMENTED SEED

In spite of continued progress, it may be several years before bred monogerm seed is available for commercial growers in this country. In the meantime, seed treatment to remove the outer husk, or cracking the cluster into smaller seed-bearing fragments, has been widely adopted as a means of producing single seedlings. Knolle in Germany (38) devised a method of cracking beet seed mechanically, which is used at the present time in that country. In 1941, Bainer (2) in the USA developed a machine which sheared the clusters into seed-containing fragments of the required size. Because of the war and the consequent shortage of labour, ' segmented ' seed produced in this way was very rapidly adopted by the principal sugar-beet companies in the USA (65) (39) and was also tested in this country in the years immediately after the war (69) (13).

Although, undoubtedly, segmented seed produces a much higher proportion of single plants than natural untreated seed, there are two serious objections to its use : (i) it is wasteful, because when the seed is sheared quantities of dust and fragments of husk are produced and about half the original number of viable units are lost (4) ; (ii) the field germination of the clusters is greatly reduced. The results of a nation-wide series of experiments in the UK in 1945 and 1946 which were summarized by Culpin (13) showed that only about one-third of the sown clusters produced seedlings. Thus although 1 lb. segmented seed contained about 50,000 clusters and natural seed 20,000, to produce equal numbers of seedlings it was necessary to sow equal weights of the two types of seed. Since 3 lb. of natural seed is required to produce 1 lb. of segmented seed the effective recovery of viable seed units under field conditions was therefore only about 35% : this compares with the recovery of 50% suggested by Bainer and Leach. Because of this wastage, segmentation has been largely superseded by other less drastic methods of processing, although segmented seed is still offered by one sugar company in the USA and is used to a limited extent in continental Europe (15).

DECORTICATED AND RUBBED SEED

At present most of the processed beet seed used in the USA, the UK and on the continent of Europe is decorticated. In this process, which was first developed by Bainer (3) in the USA, the clusters are not cut into fragments but are rubbed down to the desired size by passing between a rubber pad and a rapidly revolving emery wheel ; the amount of husk and peripheral germs rubbed away is governed by the gap between the pad and the wheel ; by adjusting this gap, samples of seed that differ in their mean cluster-size can be produced. In the production of the standard commercial decorticated or 'rubbed and graded' seed in this country the setting of the machine ensures that the bulk of the processed seed passes an 11/64ths-in. sieve, any oversize clusters being returned for re-processing. The smallest cluster and fragments less than 7/64ths of an inch are rejected and between these limits, 60–70% by weight of good seed is recovered, as compared with 35% for segmented seed (27).

Decorticated seed comprises clusters of different sizes all of which are more rounded and run more regularly in a drill than natural seed : the smaller clusters are of reduced germination capacity, but give rise to a high proportion of single plants, while the larger ones germinate well, but produce few singles. Thus in a 3-yr. trial at the Norfolk Agricultural Station, in which individual clusters were sown by hand, the 7–8/64ths-in. fraction had a field germination of 61%, the germinated seeds giving 77% single seedlings, while the 10–11/64ths-in. clusters had a field germination of 74% with 39% singles (27). The proportion of the different size-grades in the bulk varies

with the season and the conditions under which the seed crop is harvested, but over three years (of which one year was extremely unfavourable for germination) the rubbed and graded seed averaged 10% less germination than the parent natural seed and gave nearly 20% more single plants (33). It is difficult to compare these results with American experience because, in the USA, overall germination capacity of the seed is higher and the mean cluster-size is smaller. However, the figures quoted by Bainer and Leach (4) suggest that decorticated seed produced in the same manner as the British rubbed and graded seed, but graded to 7–9/64ths of an inch, germinated about as well as the original seed and reduced the number of seedlings per viable seed-unit by roughly 20%. A review by Culpin (15), based on a questionnaire issued to the principal sugar-beet-growing countries, showed that rubbed seed grown under commercial conditions gave satisfactory field emergence of 55–65% and was up to the required standard for regular seedling stands.

The advantages of decorticated and rubbed seed compared with natural seed may be summarized as follows. (1) The beet clusters, being smooth and more uniform, run more easily in a drill. (2) When singling was timed on a large number of commercial farms, the use of rubbed seed saved about 10% in hand labour without loss in final plant (33). (3) The results of a 4-yr. experiment at the Norfolk Agricultural Station, reported by Whybrew (70), indicate that the use of rubbed seed lessens the ill effects of delayed singling. (4) The same experiment showed that if singled under optimum conditions the yield of roots from a crop grown from rubbed seed was as good as that from natural seed.

In spite of these advantages the most recent information summarized by Culpin (15) is that, in Europe, the use of rubbed seed is virtually confined to Ireland (30% of crop grown from rubbed seed), Gt Britain (36%) and Sweden (45%). In Germany, 25–30% of the crop is sown with seed obtained by the Knolle process while in the USA practically the entire acreage is either sown with rubbed (decorticated) seed or segmented seed, the latter being still preferred by one company.

The failure of seed processing to gain acceptance in some countries may be associated with the local soil type on which beet is most commonly grown. In the Netherlands, for example, where heavy soils predominate, the risk of bad emergence in an unfavourable season is regarded as a serious disadvantage of rubbed seed (35) and many farmers on clay land in this country prefer to use natural seed for early sowings. On more kindly soils, however, rubbed seed gives consistently satisfactory plant emergence as was shown experimentally at the Norfolk Agricultural Station (29).

Future trends are likely to include grading within closer limits in order to provide a more uniform product, and, since this may affect emergence, greater emphasis will be placed on grading by density which has been shown by the British Sugar Corporation (7) to improve emergence by the removal of the lighter non-viable seed-clusters.

DEVELOPMENTS IN DRILL DESIGN

In order to lighten the work of hand singling it is not necessary that every seedling in the row should be a single one; as Rayns (60) has pointed out, the need is for a sufficiency of seedlings standing alone within an inch or two of the correct spacing-interval for the crop. These seedlings will be the plants left by the hoeman, and the remainder will be struck out, whether they are singles or multiple bunches. Hence, some advantage accrues from the use of rubbed seed, even with the traditional root drill which delivers seed in an irregular stream. Nevertheless, the benefit is not great because unless comparatively high seed rates (8–10 lb. of rubbed seed per acre) are sown in this type of drill, there is a danger of gappiness in the stand, especially where growing conditions are unfavourable. On the other hand the need to ensure enough plants at the thinnest place in the row implies an excess of seedlings elswhere, in which case the advantage of the greater singleness of the seed is lost. It follows that the successful use of seed of improved ' singleness ' is linked with the development of better drills to sow individual seeds at regular intervals. Early machines referred to as ' spacing drills ' were tested at the Norfolk Agricultural Station before the last war (52) with varying success. There are considerable difficulties in designing a sowing mechanism which spaces the seed accurately and is also reliable under farm conditions; perhaps the chief problem arises in coulter design. The sowing mechanism must function close to the ground, because the pattern of regular delivery is disturbed if the seed has to drop down a long coulter tube.

During and after the last war, much progress was made in the development of precision-sowing mechanisms in the USA (45) (46) (59). In the UK, manufacturers have been encouraged to develop new machines by the drilling demonstrations, sponsored by the official Sugar Beet Research and Education Committee. Progress made in this work up to 1955 was critically reviewed by Maughan (42) in discussing the replies to a comprehensive questionnaire issued to a number of countries where sugar-beet is cultivated. He reported that, apart from America, Canada and Ireland, most countries were disappointed in precision-drill performance, the main reason being that the machines could not be used for sowing other crops and, therefore, their restricted use and high cost did not justify the comparatively small gain in regularity of distribution.

In many cases the performance of a precision drill is disappointing, because too much seed is sown as an insurance against adverse germination conditions. The full potential benefit of the precision drill can be realised only if the quantity of seed sown is small enough to preserve the pattern of the individual seed spacing. But low seed rates are only justified in practice if field germination is very high, otherwise there is a risk of a crop failure through insufficient plants. The effectiveness of a precision drill is therefore closely linked with full and reliable seed emergence, which, in turn, depends both on the quality of the seed and on careful seed-bed preparation. Since Maughan's review, however, at least two types of precision drill made in the UK have proved reliable and adaptable for brassica crops as well as for sugar-beet and recent improvements in seed dressing (25) and in seed grading have enabled farmers to obtain good results and save thinning-labour by sowing 4–5 lb. per acre of rubbed and graded seed in these drills.

The chief factors for successful precision drilling are :—

1. Drill slowly – 2 m.p.h. is probably ideal. From the farmer's point of view slow working is a serious disadvantage, which may be overcome in the future by the use of 8–12 seeder-units mounted on a toolbar, rather than the normal 4- to 6-row equipment.
2. The seeder mechanism must not grind or otherwise damage the seed. In many designs the seed is carried from the hopper in small recesses formed in the rims of rotating metal wheels and the individual clusters are ejected from these recesses into the coulter tube. With mechanisms of this type, particularly where ungraded seed comprising clusters of widely varying size is used, damage is more common than with seeder units which deliver the seed over rubber belts. This point is made by Barmington (5) in a recent comparative test of selected European and American seeder mechanisms. Rubber belts also have the advantage of cheapness and a range of belts suitable for different spacings and grades of seed can be provided at much less cost than the alternative of metal plates or discs.
3. The drill should be capable of sowing other crops such as brassicas. For example, one make of precision drill has been successfully used for drilling swedes or kale (32) and versatility weighs heavily with a farmer who is considering the purchase of new equipment.
4. The drill should be robust and capable of standing up to normal farm usage. It is perhaps unreasonable to suggest that a delicate mechanism which must operate close to the ground can have the same solid construction or long life as the ordinary cup-feed drill in which the working parts are well clear of the ground and less exposed to abrasion from dust and stones. But the construction of some precision drills that have appeared on the market has shown a lack of appreciation of the essential function of a drill, which is to place the seed in the ground in the most favourable manner for seedling growth. Most precision drills will work efficiently when seed-bed conditions are ideal and it is sometimes argued that beet ought not to be drilled except under good conditions. However, sugar-beet is grown on a wide range of soils including heavy clay and stony soils where seed beds are seldom ideal and the farmer's common criticism is that the precision-seeder unit under these conditions is less effective as a drill than the traditional root drill. For instance, it is important that the drive to the seeder mechanism should work efficiently, even on stony land, since with land-wheel drive, any slip or temporary blockage alters the seed rate and the pattern of sowing. In one machine recently introduced from Sweden, the seeding mechanism is driven from the power take-off of the tractor and it may be that this trend will become more general.
5. In a precision drill, seed is delivered from an enclosed mechanism very close to the ground and some means of knowing whether seed is actually being sown is very desirable. One make of drill incorporates a system of warning lights, which works well in practice.

As has been said, good field germination is absolutely essential if low seed rates are to be used without lowering the standard of final plant. Much attention has therefore been paid to those aspects of drill design which help to ensure uniform and complete seedling emergence. The method of consolidation behind the coulter is known to affect plant establishment. As compared with single-wheel rollers which are standard components of normal root drills, French (23) found that rollers constructed of narrow, independently-rotating sections improved emergence. Work at the Norfolk Agricultural Station, reported by Jones (34), has shown that 6 – 17% better seedling emergence resulted from using squirrel-cage ' hollow rollers ', as compared with the solid type ; the hollow roller showed to best advantage in years when heavy rain fell after drilling because, under these conditions, it gave adequate consolidation over the beet row, with no risk of capping. Rubber-tyred press wheels were stated by Fischer (19) to give 14% better emergence in dry areas in the USA. Regular depth of sowing is also important and both Jones (34) and French (23) reported favourably on the furrow-former provided with depth bands, as compared with the conventional double-disc or Suffolk coulter. Nevertheless, practical farming opinion is

that ' putting the seed into the moisture ' is the critical factor in obtaining uniform emergence and the relative effectiveness of different designs of coulter depends on the conditions of moisture and tilth prevailing at the time.

With this aim in mind, it has been suggested that a heavy press wheel should be used which would run immediately after the coulter and press the seed into moist soil before it is covered. Preliminary work at the Norfolk Agricultural Station (54) showed some benefit where press wheels were used in a dry spring and Heller (30), in Germany, has reported a 20% improvement in emergence, even under normal seed-bed conditions. On a heavy clay soil in the Netherlands, however, Jorritsma (36) found no improvement in emergence from the press wheel and undoubtedly its effectiveness is dependent on soil texture and moisture content.

MECHANICAL THINNING

More single plants and more even spacing of the seed in the row are valuable aids to easier hand singling. An alternative approach is to replace hand labour by the machine to a greater or less extent. Three ways of thinning the crop mechanically may be distinguished :—

CROSS-CULTIVATION

Light and air can be let into an over-thick stand by cross-cultivation with a harrow or finger weeder ; this does not do away with the need for hand singling, but it helps to avoid the ill effects of undue plant competition in the seedling stage.

CROSS-BLOCKING AND GAPPING

Cross-blocking means drawing a set of hoes across the seed rows in such a way that the majority of plants are cut out, leaving bunches of plants in the positions where a single plant is required to grow until harvest. Gapping achieves the same results by using a machine which travels down the rows.

As a means for reducing the hand labour of thinning, cross-blocking has been tested in most sugar-beet-growing countries. Earlier work in the USA was described by Scalley (64) and Mervine (48); in some later work, e.g. Doxtator (18), the thinning treatment, although referred to as cross-blocking, was more akin to what is now termed down-the-row thinning, since the widths of alternate cut and bunch were much smaller than is required to leave a normal population of bunches per acre.

As Maughan (42) reports, the general experience with cross-blocking or gapping is that they do not adequately solve the problem of thinning sugar-beet. Although economies in hand labour may be up to 30% (66), this saving is largely gained at the expense of plant population. The reasons for the disappointing results of cross-blocking may be summarized thus : (a) The braird must be extremely regular, or wide gaps will be left after the passage of the machine. For example, where 3-in. bunches with 10 in. between centres are left, the absence of a seedling in a single 3-in. width of uncut row means a gap of roughly 20 in. and much longer gaps may result from a chance succession of uncut portions of row devoid of plants. (b) Because of irregularities in the stand of seedlings, it is usually found that a satisfactory final plant stand can only be obtained if the portions of row left uncut are so wide that the bunches remaining are likely to contain several seedlings; hence, little real saving in time can be expected because the isolation of the single plant is the time-consuming element in thinning. (c) If the hoeman accidentally hoes out a bunch, he cannot compensate for the mistake and his knowledge of this slows his pace ; hoemen usually prefer to single a continuous row of seedlings, rather than a fixed pattern of bunches. Nevertheless, gapping the crop, either by hand or cross-blocking extends the time when the crop may be thinned without loss of yield. At the Norfolk Agricultural Station (26) it was found that when the crop was gapped or ' bunched', it could be left for 7 days before singling without loss of yield and this breathing space can be of great value when the beet are growing away from the hoe.

DOWN-THE-ROW THINNING

More recent work has emphasised that the best results with machine thinning are obtained where the uncut lengths of row left by the machine are small and the chances of a single-plant bunch are therefore reasonably high. At the same time the chances of a blank are also greater and therefore the aim must be to leave a larger number of small bunches. This is impossible with normal cross-blocking equipment, because the hoes would become blocked with earth and stones. The difficulty has been overcome by the development of machines operating in the same direction as the rows, instead of across them. In one type of thinner, the rows are cut by rotating blades which radiate from a central hub like the spokes of a wheel, and in others by discs with cut-away sections round the edges. The technique of down-the-row thinning was first developed in the USA, particularly in the Great Plains area, where, as was reported by Maughan (42), 40% of the crop in 1955 was thinned by machine plus hand work and a further 20% thinned by machine only. In other sugar-beet-growing countries, down-the-row thinning is rarely carried out commercially, though in certain districts in the UK the scarcity of labour has led to increasing interest in this practice.

Down-the-row thinning can vary from merely opening up a thick crop, to the complete elimination of all hand labour ; the extent to which the machine can replace hand work depends largely on the regularity of the initial seedling stand. By

making the most of what plants are there, the skilled hoeman can compensate to a considerable extent for deficiencies in the original braird, but the greater the reliance placed on the machine, which is rigid and inflexible in its mode of action, the better must be the distribution of the stand of seedlings. The risk of gappiness could, of course, be overcome by sowing more seed, but such a course defeats its own ends, because even small uncut portions of a thick braird of seedlings are likely to contain a multiple bunch requiring separation by hand. Hence, the effectiveness of machine thinning is linked with use of the precision drill and careful seed-bed preparation to produce a thin, but regular, row of seedlings.

With normal stands the method known as the Windsor system, developed by the Great Western Sugar Company in America (1), has given good results in the USA and in the UK (43) (44). The object of this method is to thin the crop in two stages. The first passage of the machine shortly before the 4-true-leaf stage cuts out 50% of the row in alternating 1·75-in. widths. The nature of the second treatment, carried out a few days later after the surviving plants are standing up again, depends on the numbers of plants remaining after the first operation, but twice as many hoes with smaller blades are normally used. Thinning is then completed by hand to remove doubles and any weeds that remain ; down-the-row thinning in itself has a valuable effect in destroying weeds and, in the Netherlands particularly (36), a pre-thinning treatment with rotating spring tines at the time when weed- and beet-seedlings are very small is considered a useful additional cultivation. Using this system, experiments in this country undertaken by the NIAE showed (43) that the total amount of hand labour (including a later second hoeing or ' scoring ') was reduced by 15–20% without loss of crop, and that savings of up to 40% had been achieved at the expense of a small loss of crop. This was subsequently confirmed by the experimental results reported from European countries, notably the Netherlands (36). In some cases in the USA, large savings are reported to have been associated with some loss of yield, but not to the extent that might be expected from the reduction in plant stands. For example, French (23) reported an average saving of 40% in thinning time for two experimental years in the Michigan area, but the number of marketable roots was reduced from 23,000 on the hand-thinned plots to 17,800 on the machine-thinned—a disastrous fall in population by European standards, but which only reduced yield in these experiments from 12·5 tons per acre to 11·5 tons.

The character of the final plant stand after mechanical thinning differs from that left by hand singling in two important respects: (a) The spacing of the plants in the row is more irregular after machine work. The effect of this on yield has been studied recently in a series of trials carried out by the British Sugar Corporation (67). Plant distributions typical of (i) hand work, (ii) twice through with a down-the-row thinner, followed by hand hoeing, and (iii) twice machine-thinned, only, with no hand work, were experimentally produced in field trials. It was concluded that provided plant population was maintained at a level of not less than 25,000 plants per acre, the degree of irregularity in spacing likely to be found after machine thinning affected yield very little. However, this number of plants can be obtained from an irregular stand only if the hoeman is provided with narrower hoes than the customary 7-in. type and is willing to leave some plants close together to compensate for the wider gaps. Otherwise, final plant populations will tend to be lower after machine thinning and this is likely to reduce yield, although except where the population falls below about 25,000 plants per acre, the reduction may not be very appreciable—e.g., in one experiment reported from the NIAE (44), machine thinning saved 38% hand labour, reduced plant populations from 26,500 to 24,000 and resulted in a loss of 1 ton per acre, which was, however, statistically insignificant.

(b) Where hand labour after the machine is confined to a rapid removal of weeds, the proportion of double plants is increased, the numbers, of course, depending on the speed at which the final hand hoeing is done. Experiments reported by Frakes (20) showed that up to 30% of doubles could be left in the crop without significantly affecting yield and this was supported by work at the Norfolk Agricultural Station (28) and in the Netherlands (35) ; with 30% doubles, Deming (16) found that root yield was reduced by 7% but at the Norfolk Agricultural Station a loss of this magnitude occurred only when 70% of the plants in the final stand were doubles. In discussing plant populations where doubles are present, a distinction has to be made between the total number of beet plants in the row and the number of single plants, or groups of two or more plants, separated by the normal singling interval. The latter are referred to as plant ' stations ' or ' hills ' and the figures given above refer to the occurrence of multiple plants at comparable numbers of plant stations in the row. According to Deming the existence of multiples did not compensate in any way for a reduction in the number of plant stations, even though the total number of seedlings per unit-length of row was the same, but on irrigated and fertile land, McBirney (47) found that if the number of plants (not stations) was kept constant there was little loss of yield, even if half the plants were doubles. This is equivalent to a very drastic reduction in the number of plant stations in the

row and it is most unlikely that this could be tolerated under English conditions without serious loss of root yield.

In assessing the effects of irregularity of spacing or multiple plants, experimental plots of beet are usually harvested by hand and all roots are taken into account. However, in 1957 approximately 50% of the commercial acreage in the UK was harvested by machine and the acreage is likely to increase in the future. The extent to which mechanical harvesters can deal successfully with irregularly spaced crops with a high proportion of double plants is probably the chief consideration which determines how far a farmer is prepared to go in eliminating hand labour in the spring. Experimental work in progress conducted by the British Sugar Corporation and the NIAE (51) has suggested that the loss of crop where the beet were thinned by machine only was about 2 tons per acre, as compared with hand work alone, although it should be noted that the hand work in these experiments was of a standard higher than is normally achieved in commercial practice, e.g., the plant population was 29,700 per acre. Where machine thinning was followed by hand work, the reduction in yield was less. The complications of mechanically harvesting an irregular stand resulting from the use of a thinner, are likely to be reflected in harvesting losses, rather than in the efficiency of topping. With current designs of harvester it appears from preliminary testing (41) that the type of machine which lifts the beet and then tops them is likely to have smaller losses.

CHEMICAL WEED CONTROL IN SUGAR-BEET

Husbandry methods for controlling weeds in sugar-beet are usually effective where hand labour is used for thinning ; piece-work agreements for singling customarily require weeds to be cut out from the row, and inter-row cultivations during the season take care of weeds growing between the rows. If, however, hand work is to be progressively replaced by the machine and particularly where precision drills with low seed rates are used, some other means of controlling weeds in the row is needed; a thick stand of beet will crowd out other seedlings, but a thinly spaced crop is quickly invaded by weeds, and the resultant braird of mixed weeds and beet is more difficult to single than a continuous row of beet plants. Traditional methods of cleaning seed-beds, such as early seed-bed preparation to encourage weed growth which is destroyed when the land is worked again, conflict with the idea of minimum and rapid preparation of the seed-bed in order to conserve moisture and delay sowing. Hence, chemical methods offer a possible solution to the problem.

A considerable literature on this subject has been built up during the last decade, particularly in the USA, the UK and the Netherlands. Four principal techniques have been developed, and since sugar-beet is limited in its tolerance to chemicals, the emphasis has been on their application before emergence.

1. Pre-emergence applications with chemicals having a residual effect, applied before drilling to control grass weeds and particularly wild oats. American experience with a number of chemicals tested for this purpose has been reported by Freed and Pendleton (21), Deming (17) and Nelson (49); a useful summary is given by Nelson (50). It was found that 3 lb. propham per acre in diesel oil, when applied during seed-bed preparation and disced to a depth of 3 – 4 in. gave effective control of wild oats without damage to the crop : these recommendations were followed by one sugar company in 1953 in treating 4800 acres of beet with generally satisfactory results. TCA at 5 lb. per acre also gave good control of grassy weeds although Nelson does not refer specifically to its use against wild oats. These results were confirmed by Parker's experiments in England (58) (57) (54). Wild-oat control was the chief objective, and, although 3 lb. propham gave good control of wild oats, TCA at 6 lb. per acre gave an equally good kill, with less risk of damage to the beet. It should be added that the most recent recommended rate for TCA is 7·5 lb. per acre. The herbicidal effect of TCA, however, is limited to grass weeds, whilst propham has also given good control of chickweed (*Stellaria media*) and knotgrass (*Polygonum aviculare*), both common weeds in beet crops on light soils.
2. Pre-emergence spraying with chemicals at or after drilling. Propham can be used in this way to control broad-leaved weeds. Other chemicals have been tested, including fenuron (PDU or phenyldimethylurea) and certain carbamates and acetamides, but none has so far given results as good as propham, either because they are less selective, or because they are more dependent on soil-moisture conditions. Endothal is another chemical which has shown promise in the USA (50) and it is now being tested in the UK. Since the object of spraying is primarily to control weeds in the row, band spraying over the seed row at the time of drilling offers useful economies in material. Ripper (61) designed equipment which sows the seed and interposes a protective layer of adsorbent carbon over the partially filled seed furrow, before covering completely with soil; simultaneously, a band of propham or other suitable herbicide is sprayed over the seed row. By protecting the germinating beet in the first critical stages from the effects of herbicide it has proved

possible to increase the dose used and so obtain a more complete kill of weeds without damage to the beet.

3. Pre-emergence applications of contact herbicides. Unless the beet are drilled on a stale seed-bed in which the weeds have already partially germinated — a practice which may lead to drying of the tilth — this method of control is effective only if the weeds germinate more rapidly than the crop, so that there is a brief period before the beet seedlings have emerged when the weeds are showing above ground and can be destroyed. The chemical most widely tested for this purpose has been PCP (pentachlorophenol). Lloyd (40) and Hunt (31) have reviewed experience with PCP on varying crops and work specifically on sugar-beet has been reported by Parker (57) (58). 3–4 lb. PCP as a 15% miscible oil in 8–28 gal. water per acre has given good results provided, (a) that timing is correct i.e. delayed as long as possible after drilling, but before any beet seedlings have emerged ; (b) that warm weather has prevailed and encouraged maximum growth of weed seedlings. The method is therefore mainly applicable in the warmer, wetter districts where weed growth is very rapid, or where the common weeds are quick-growing species such as charlock (*Brassica sinapis*) or wild radish (*Raphanus raphanistrum*).
4. Post-emergence spraying. Both nitrate of soda and common salt as sprays have been used for controlling weeds after the beet have emerged (57) (58). Nitrate of soda at 2·5–3 cwt. in 100 gal. of water per acre plus a suitable wetting agent, applied after the beet have 2 true leaves will kill most annual weeds up to 3 in. high without harming the beet, provided that the weather remains dry for 24 hr. after spraying. Weeds closely related to beet, such as fat hen (*Chenopodium album*) and orache (*Atriplex patula*), are not affected. The nitrate of soda also acts as a fertilizer and experiments at the Norfolk Agricultural Station (53) have indicated that the fertilizing effect of the spray is as good as the equivalent amount of nitrogen, either on the seed-bed, or as a top-dressing. As a herbicide, common salt is as effective as nitrate of soda, but lacks its manurial value ; is also cheaper, but is more difficult to dissolve in water.

The conclusion from the work with these post-emergence sprays is that although they may occasionally be very successful as an emergency treatment when, for example, a heavy infestation of chickweed threatens to smother the crop, their use is unlikely to become a routine measure, owing to the risk of failure if rain falls after application.

CONCLUSION

Since the introduction of turnips, the root crop has been regarded as the cleaning crop of the rotation. In many areas sugar-beet has largely replaced roots for feeding, but most farmers have still in mind the traditional high standards of cultivation for the root crop and try to maintain them as far as their labour force permits.

In the more intensive arable districts where potatoes, peas and market-garden crops are grown as well as beet, the labour force is generally still large enough to single the beet by hand. Growers in these districts prefer to think of spring mechanization in terms of high quality ' single ' seed and improved seed drills. These result in a thinner braird with an increased proportion of single plants and make possible easier and quicker hand singling. By these means, a ' hand-made ' final plant stand free from weeds is assured and difficulties with mechanical harvesting are reduced to a minimum. On farms based mainly on cereal-growing, and where the labour force has been reduced to a minimum, the farmer must be prepared to rely increasingly on machine thinning and thereby accept some lowering in the standard of workmanship, in regularity of plant stands and in the control of weeds. For him, the main problem is to maintain a high total number of plants per acre and he looks to improvements in harvester performance to harvest his crop mechanically, without undue loss of yield.

The aids to quicker singling which have been described are equally applicable to mangolds and also to brassica crops such as kale. The seeds of brassicas, of course, give rise to single seedlings only and if kale, in particular, is sown at a low seed rate in a precision drill, crops suitable for strip grazing can be obtained with very little hand work.

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FIELD CROPS

CEREALS

WHEAT

See also Abs. 979, 1029, 1056, 1057, 1058, 1059, 1060, 1063, 1070, 1208, 1219, 1307, 1322, 1325, 1326, 1327, 1331

896 MARIANI, M. La coltivazione di frumenti duri nella Cirenaica settentrionale. [**Durum wheat-growing (*Triticum durum*) in northern Cyrenaica.**] *Riv. Agric. subtrop.* 1957, **51,** No. 10–12, 438–46, bibl. 3, illus., English summary.

897 BRICCOLI-BATI, M. Comportamento di alcune varietà di grano in relazione all'epoca di semina. [**Behaviour of some wheat varieties in relation to sowing date.**] *Ann. Fac. Agr., Perugia* 1956, **12,** 33–50, bibl. 3. [Received March, 1958]

In a plot trial (432 plots, 2 × 2 m. each) in the Mugello, Tuscany, the early autumn variety Funo of *Triticum vulgare*, and 3 varieties of *T. durum*, Biancone dell'Elba, autumn type, Russello S.G.7, medium-early autumn type, and Timilia, spring type, were each sown at about 10-day intervals from 1 Aug. 1953 to 31 July 1954. Results showed that: (a) the plants of Russello and Timilia reached their greatest heights when sown from beginning of Nov. to end of Jan., those of Biancone with the earliest sowings, and those of Funo when sown in Feb.–Apr. ; (b) the highest weights of whole plants were obtained with sowings from 10 Oct. to 10 Nov. ; (c) the highest grain yields were obtained with sowings before the end of Oct. for Biancone, and with sowings from 1 Oct. to end of Feb. for the other varieties, Funo being considerably better than the other varieties, while Timilia gave the lowest yields.—E.B.O.

898 MOTWANI, V. T. **One-way drilling of wheat will pay Saurashtra farmers.** *Indian Fmg* 1957, **7,** No. 9, 11. [Agric. Res. Farms, Saurashtra]

One-way drilling of wheat with 9 in. between rows gave 23% higher yields than the local method which consisted of drilling with 18 in. between rows but repeating the operation in 3 different directions on the same piece of land to give a broadcast effect. These yield increases were obtained with 20% less seed, 30% less sowing time and 20% less labour for harvesting than were required for the local method.—D.B.

899 HEDLIN, R. A. and others. **Effect of crop residues and fertilizer treatments on the yield and protein content of wheat.** *Canad. J. Soil Sci.* 1957, **37,** No. 1, 34–40, bibl. 8. [Winnipeg, Manitoba]

The return of cereal-crop straw to the land has been the recommended practice in Manitoba for several years. These residues protect the soil against erosion, but evidence is presented here which shows that they also reduce the yield of the following grain crop. Higher yields of wheat, with a higher protein content, were obtained when wheat was preceded by lucerne, or a lucerne/grass mixture, than by a grass break or a fallow on which wheat stubble had been incorporated into the soil. The reason advanced for these lower yields is the immobilization of N during decomposition of grass and stubble residues. The depression was partially offset by the application of N in the form of ammonium phosphate, (the equivalent of 16 : 20 : 0 at 108 lb./ac.). Fertilizer treatments had little effect on protein content.—D.B.

900 NATIONAL INSTITUTE OF AGRICULTURAL BOTANY, CAMBRIDGE. **Varieties of winter wheats.** *Fmrs' Leafl. 8 N.I.A.B.* 1958, pp. 4.

Twelve varieties of winter wheat are recommended for Britain. Information is given on their agronomic characteristics, potentialities and quality. The most recently recommended are Dominator and Milfast.—M.P.

901 NATIONAL INSTITUTE OF AGRICULTURAL BOTANY, CAMBRIDGE. **Varieties of spring wheats.** *Fmrs' Leafl. 9 N.I.A.B.* 1958, pp. 2.

Notes are given on the agronomic characteristics of the spring wheat varieties Koga II, Svenno, Atson, Peko, Atle, Bersee and Fylgia II, recommended for growers in Britain.—M.P.

902 STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR, DENMARK. Forsøg med vårhvede. [**Spring wheat trials.**] *Medd. 557 Stat. Forsøgsvirk. Plantekult.* [Contained in] *Tidsskr. Planteavl* 1957, **61,** No. 3, 549–50.

In comparisons at 5 locations in Denmark during 1943–6, Abed Maja spring barley gave average grain yields of 45·4 hkg. and straw yields of 44·2 hkg., compared with 39·6 and 60·6 hkg./ha., respectively, for Svalöf Progress spring wheat. In trials at 3 locations during 1950–5, average grain yields of the spring wheats Weibulls Pondus, Weibulls Kärn II, Svalöf Progress, Pajbjerg 85/17 (1952–5) and Svalöf Ella (1950–2) were 39·6, 39·4, 36·9, 37·8 and 37·2 hkg./ha., respectively. These varieties are briefly described.—P.J.B.

903 STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR, DENMARK. Forsøg med hvedesorter 1953–1957. [**Trials with wheat varieties 1953–7.**] *Medd. 587 Stat. Forsøgsvirk. Plantekult.* 1958, pp. 4.

The results are given of trials with 9 varieties of winter wheat at 12 locations in Denmark. During 1953–7 in 49 trials, the mean grain yields of Weibulls Eroica, Øtofte 56, Cappelle Desprez and Hunsballe R were 47·4, 49·3, 49 and 48·9 hkg./ha., respectively. During 1954–7 (40 trials),

Heine VII and Weibulls Banco gave an average of 50·7 and 49·1 hkg./ha. grain ; during 1956–7 (21 trials), the mean grain yields of Sophiehoj 13, Abed 853 and Svalöf Svale were 49·3, 48·7 and 48·2 hkg./ha., respectively. Weibulls Eroica, Øtofte 56, Hunsballe R and Weibulls Banco were very winterhardy, while Cappelle Desprez was considerably inferior to the other varieties in this respect. Cappelle Desprez and Heine VII had the shortest straw and were the most resistant to lodging. Brief notes are given on the varieties tested. [See also *Fld Crop Abstr.* 10 : 12.]—P.J.B.

904 FAJERSSON, F. Weibulls Original Eroica-vete II i jämförelse med Eroica. [**Weibull's Original Eroica II wheat compared with Eroica.**] *Agri Hort. Genet.* 1957, **15**, 3–4, 214–22, bibl. 8, English and German summaries. [Weibullsholm Pl. Breed. Sta., Landskrona, Sweden]

Data are given of the results of trials during 13 years, mostly in the coastal provinces of S. Sweden, to compare the winter wheats Eroica and Eroica II. In certain cases, Skandia III B was also included. There were no significant differences between the grain yields of Eroica II and Eroica, or between Eroica II and Skandia IIIB. Eroica II tended to do slightly better than Eroica in northerly parts of the trial region, owing to its winterhardiness. Eroica II was similar to Eroica in straw stiffness, time of maturity, disease resistance and resistance to shedding and was slightly, but significantly, higher in hectolitre-weight.—P.J.B.

905 FAJERSSON, F. Weibulls winterweizen Ertus, ein ergebnis Schwedischer qualitätszüchtung. [**Weibull's Ertus winter wheat, a product of Swedish breeding for quality.**] *Agri Hort. Genet.* 1957, **15**, 3–4, 223–32, bibl. 10, English and Swedish summaries. [Weibullsholm Pl. Breed. Sta., Landskrona, Sweden]

The results are given of trials to compare Ertus with Eroica, Virtus, Odin and Ergo. The 1000-grain weight of Ertus was, in all cases, lower than that of the other varieties and the hectolitre-weight higher, though in the latter respect, there was little difference between Ertus and Eroica. The gluten content of Ertus was higher than that of Eroica, Virtus and Odin, and the same as that of Ergo. Viscosity and bread-volume determinations showed a considerable superiority for Ertus over the other varieties. The gluten quality of Ertus was classified as medium-high. In yield trials during 6 years, Ertus gave 4·9% higher grain yields than Ergo, but 2% lower yields than Odin (8 years). In straw stiffness, Ertus was similar to Ergo and slightly inferior to Odin ; also, Odin was slightly more winterhardy than Ertus.—P.J.B.

906 ESTACIÓN EXPERIMENTAL DE AULA DEI. SPAIN. Departamento de mejora. Ensayos 1956–1957. [**Improvement Department. Trials in 1956–7.**] Zaragoza, [n.d.], pp. 18.

Plot trials under dry conditions. Of the wheat varieties tested, Caspino 1 was best with 1232 kg./ha., followed by Aragón 03 ; of the barleys Albacete 1 was best with 1157 kg./ha., followed by La Almunia. Plot trials under irrigation with high application of N. Of the wheats Pané 247 and Dimas were best (5653 and 5647 kg./ha., respectively) ; of the barleys Rosa was best with 4309 kg./ha.—E.B.O.

907 BONFIGLIOLI, O. Prove con razze di frumento italiane in Jugoslavia. [**Trials with Italian wheat varieties in Yugoslavia.**] *Sementi elette* 1957, **3**, No. 6, 6–14, illus., English and German summaries. [Ente Naz. Sementi Elette]

908 THORPE, H. C. and DIXON, G. E. **Release of new cereal varieties.** *K.I.O. Fortnightly* 1958, No. 450, 2–3 ; No. 451, 1–3. [Pl. Breed. Sta., Njoro, Kenya]

A description is given of new cereal varieties released for 1958–9 in Kenya, together with recommendations on the altitudes for which they are suitable. Wheat : R.L. 2150/A (from Canada), 362.B.1.A.2, 367.AR.3.B.2.B, H.462 (from the USA), Sabanero/1, 367.BR.1.D.4.B, Cross 339. Barley : Research (Mid-season). Varieties recommended for the 1958/9 growing season are also given.—M.P.

909 PAL, B. P. **N.P. 710 – the cosmopolitan wheat.** *Indian Fmg* 1957, **7**, No. 7, 6–7, illus. [Indian Agric. Res. Inst., New Delhi]

The outstanding property of the new Pusa wheat, N.P. 710, is its resistance to *Puccinia graminis* and *Ustilago tritici*. It is also resistant to lodging even under heavy manuring, which it requires. Though the best time of sowing is late October to early November it can be sown as late as mid-December if given additional N fertilizer. The plant tillers profusely and is medium-early in maturing. Its bold, amber, hard grains contain 12% protein. N.P. 710 is recommended for the States of Uttar Pradesh, Madhya Pradesh, West Bengal, Orissa and Bombay where it has yielded from 2300 to 2600 lb./ac. Limited quantities of pure seed can be obtained from the above-named Institute.—D.B.

910 SIMS, H. J. and MULLALY, J. V. **Relationship between varieties and protein content of wheat grown in Victoria.** *J. Dep. Agric. Vict.* 1958, **56**, Pt 1, 11–19, bibl. 8, illus.

911 MINISTER OF AGRICULTURE, CANADA. **Wheat varieties.** *Rep. Minist. Agric. Canada 1956–7*, 1957, 87–8.

Selkirk, a spring wheat, continues to be satisfactory in rust areas of the Prairie Provinces. In Manitoba, in 1956, it occupied 83% of the wheat area. A new, soft, white, spring wheat, Lemhi 53,

equivalent to Lemhi in quality and yield, but having greater stem-rust resistance, has been licensed for sale in Canada and should be suitable for S. Alberta. Ramsey, an amber durum wheat, which was licensed and distributed in S. Manitoba and S.E. Saskatchewan is sufficiently rust-resistant to give farmers the opportunity of growing durum wheat again in these areas.—D.B.

912 WELLINGTON, P. S. and DURHAM, V. M. **Varietal differences in the tendency of wheat to sprout in the ear.** *Emp. J. exp. Agric.* 1958, **26,** No. 101, 47–54, bibl. 7. [Official Seed Test. Sta., Cambridge]

The proportion of sprouted grains in different wheat varieties has been determined in field trials and laboratory tests, and is considered in relation to the climatic conditions and the degree of maturation. Differences in maturation occurred among the varieties with white grains, which all sprouted readily under favourable conditions in the field. Maturation was less advanced in certain varieties with red grains, which did not sprout so readily ; in other red-grained varieties the degree of maturation was similar to that of varieties with white grains, although the tendency to sprout was less. Varietal differences in the proportion of mature grains which sprouted in the field also suggest that factors such as the rate of germination, and the effect of the glumes, may determine the tendency of a variety to sprout in the ear when conditions of water supply are not optimal. F.S.—M.P.

913 RUSSELL, R. C. **Longevity studies with wheat seed and certain seed-borne fungi.** *Canad. J. Pl. Sci.* 1958, **38,** No. 1, 29–33, bibl. 3, illus. [Canad. Dep. Agric., Saskatoon, Saskatchewan]

The longevity of several lots of wheat seed with cracked seed coats was compared, over a period of 17 yr., with that of several lots of seed with sound coats. At the beginning of the test the average germination of the first group was 4% lower than that of the second. This difference increased to 12% and remained at that level for about 9 yr., but for the last 4 yr. there was little difference in the germination of the 2 groups. All seed lots germinated well for about 8 yr. ; then the seed lost its viability with increasing rapidity up to the 15th yr., after which it deteriorated more slowly until, at the end of 17 yr., nearly all the seed was dead. The longevity of 2 seed-borne fungi, *Helminthosporium sativum* and *Alternaria tenuis*, on wheat seed was compared. *A. tenuis* disappeared in about 7 yr. *H. sativum* lost its viability more slowly. 8% of the original amount was present on the seed at the end of 17 yr. F.S.—D.B.

914 POOL, M. and PATTERSON, F. L. **Moisture relations in soft red winter wheats. 1. Varietal differences and delayed harvest effects.** *Agron. J.* 1958, **50,** No. 3, 153–7, bibl. 8. [Purdue Univ. Agric. Exp. Sta., Lafayette, Indiana]

In the field, the grain of the wheat varieties Vigo, Fairfield, Royal and Seneca showed differences in rates of drying to 14% moisture content after rain or dew. These varieties differed in rate of change of moisture-absorption properties during a delayed harvest period. In the laboratory, rates of moisture-gains and -losses increased during the delayed harvest period ; these were related to internal changes in kernel structure. F.S.—R.B.

915 POOL, M. and PATTERSON, F. L. **Moisture relations in soft red winter wheats. 2. Awned versus awnless and waxy versus non-waxy glumes.** *Agron. J.* 1958, **50,** No. 3, 158–60, bibl. 9. [Purdue Univ. Agric. Exp. Sta., Lafayette, Indiana]

Two nearly isogenic wheats, one awned and the other awnless, were tested for rates of moisture gain and loss both in the field and in the laboratory. The presence of awns increased the loss and gain of moisture ; in the field the average rate of drying per hour was 1·45% for awned wheat and 1·37% for awnless wheat. Two other wheat varieties, with waxy and non-waxy glumes, were also compared. The presence of wax was found to reduce the rates of moisture absorption and moisture loss to an undesirable extent. F.S.—R.B.

916 CHAO, T. F. **Dormancy of wheat grains harvested at different stages of maturity and treated with various methods.** [Chinese] *Acta bot. sin.* 1957, **6,** No. 1, 80–90, bibl. 20, English summary. [Inst. Plant Physiol., Acad. Sin., Peking]

Three red and 3 white varieties of wheat (*Triticum vulgare*) were harvested at 4 stages of maturity (milk-, dough-, waxy- and yellow-ripe), while 9 other varieties (3 white and 6 red) were harvested at the yellow-ripe stage only. The main results were : (a) seeds in the milk-ripe stage did not germinate immediately after harvest, but a high germination percentage was obtained after 2-months' storage; those harvested in the dough-, waxy- and yellow-ripe stages showed an increase in the germination percentage ; higher percentages were found in the white than in the red varieties ; (b) the effect of desiccation with $CaCl_2$, to about 10% moisture content, on seed germination varied greatly with varieties and stages of maturity ; (c) pre-chilling at 4°C. for 2 days resulted in great increases in germination percentages in seeds harvested at the milk-ripe stage when the seeds had been first desiccated ; (d) the red varieties, one excepted, had a longer dormant period than the white varieties ; (e) an increase in germination percentage was obtained with seeds stored at 40°,

44° or 47°C. for one week ; the seeds of the white varieties lost their viability to some extent after being stored for 3 weeks at 47°C., whereas those of the red varieties remained unimpaired.—E.B.O.

917 VERMA, R. D. and BHARDWAJ, R. B. L. **Chemical weed control in wheat.** *Indian J. Agron.* 1957, **2**, No. 2, 101–2. [Indian Agric. Res. Inst., New Delhi]

The Na salt of 2,4-D, at 1 lb. a.e./ac., in 60 gal. water, sprayed on wheat 6 weeks after sowing, was effective in destroying weeds, especially *Chenopodium album*, *Asphodelus tenuifolius*, and *Convolvulus arvensis*. The grain yield of the treated area was 11–42% above the control.—D.B.

918 MYERS, L. F. and LIPSETT, J. **Competition between skeleton weed (*Chondrilla juncea* L.) and cereals in relation to nitrogen supply.** *Aust. J. agric. Res.* 1958, **9**, No. 1, 1–12, bibl. 7. [Reg. Past. Lab., Deniliquin, N.S.W.]

The effect of *C. juncea* competition on the yield of wheat and oats was investigated in seasons when rainfall was plentiful. N was the major factor limiting crop yields. In soils with comparable N-supplying powers, skeleton-weed density governed the crop's response to applied N. Competition between weed and crop was severe at low-N levels, but minor at the high-N levels achieved either by N application, or by the crop following a legume-rich pasture. Competition had its effect early in the crop's growth, since it reduced the N supply then and yields were lowered. MCPA at 1 lb./ac. applied to the fallow 54 days before sowing, or 10 days after crop emergence increased the grain yields of oats from 710 to 1370 lb./ac. ; a response equal to that from 32 lb. N/ac. applied at sowing in the same experiment. In each case, the response to spraying at the different times was analagous to the effect of a N application at these times. Early spraying gave responses in yield ; later spraying gave responses in N content of grain. The results provide a new estimate of the reduction in crop yield due to *C. juncea*. F.S.—M.P.

919 GOTTLIEB, D. **Take-all of wheat in Chile.** *Pl. Prot. Bull.* 1957, **6**, No. 2, 20–1.

An account is given of studies to control take-all (*Ophiobolus graminis*) on wheat in Chile. In greenhouse investigations, a number of wheat varieties, as well as several pasture grasses (listed), were found to be highly resistant. Only resistant grasses should be grown in rotation with wheat. Susceptible species, such as *Agropyron* spp., *Bromus* spp. and *Holcus lanatus*, would propagate the disease.—E.B.O.

920 SHIBUYA, T. **Anti-geotropism of seminal roots induced by eosin in wheat.** [Japanese] *Bull. Yamagata Univ. (Agric. Sci.)* 1957, **2**, No. 3, 195–201, bibl. 12, illus.

When wheat and rice were allowed to germinate in 0·01% solution of eosin the seminal roots became negatively geotropic, but not heliotropic. Two theories are offered : (1) that eosin prevents the formation and accumulation of the plant hormone which causes geotropism ; (2) the action of eosin opposes and is superior to that of the plant hormone. F. Eng. s.—D.B.

921 EKDAHL, I. **The growth of root hairs and roots in nutrient media and bidistilled water, and the effects of oxalate.** *K. LantbrHögsk. Ann.* 1957, **23**, 497–518, bibl. 28. [Inst. Plant Physiology]

The growth of roots and root hairs of wheat seedlings was studied.—G.M.R.

922† NIKKI, I. and others. **Studies on root-breaking in certain crop plants caused by icicle-layers developing in the ground and protection measures against the damage. 4. The density of the root development as a factor affecting the formation of icicle-layers. 5. Planting methods in relation to root-breaking.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1957, **26**, No. 2, 75–7, illus., English summary. [Kanto-Tosan Agric. Exp. Sta.]

There was little root damage from ice formation where root density was high and therefore the water content of the soil was low. The intensity of root injury resulting from ice in the soil varied with the sowing method. In wheat the injury was greater after late sowing (10–20 days after normal date) and with insufficient fertilizer. Five rows of wheat on a ridge appeared to be the optimum sowing rate for preventing root breaking as a result of ice layers in the soil. F. Eng. s. —D.B.

923 RYŽEĬ, I. P. **[Productivity of the florets in wheat in relation to time of flowering.]** [Russian] *Doklady Vsesojuz. Akad. S-H Nauk (Proc. Lenin Acad. Agric. Sci.)* 1958, **23**, No. 1, 8–10. [Kirgiz Inst. Agric.]

The author's study concerns grain yield in several winter-wheat varieties in relation to flowering time. In the different varieties there is great diversity in grain weight which depends on the age of the florets, the highest yields being obtained from the first or second florets. The data for Erythrospermum 115 show that grain yield (in mg.) per floret ranges from 48·6 when flowering is on 24 May to 29 when flowering is on 30 May.—M.H.

924 EVERT, A. F. **[Determination of critical moments regarding increased soil nutrition for two varieties of spring wheat at the phase of ear protuberance.]** [Russian] *Izv. Akad. Nauk SSSR (Bull. Acad. Sci., USSR) Biol. Ser.* 1958, No. 1, 98–103, bibl. 8, illus. [All-Union Acad. Agric. Sci., Leningrad]

Various authors have maintained that spring

wheat at the phase of ear initiation reacts sharply to supplementary mineral fertilizers. The author has studied the critical moments at which this reaction occurs in two varieties of spring wheat, namely, Tulun-70 (*Triticum vulgare* var. *graecum*) of northern origin, adapted to the Leningrad area, and the branched Kahetinskaja (*T. turgidum* var. *plinianum*) of southern origin. The supplementary fertilizer (5 g. potassium nitrate and 15 g. superphosphate in 1 l. water) was applied (500 cm.^{3} per vessel of 35 × 25 × 15 cm. capacity) to the plants as follows (days after sowing): (1) 15th, (2) 22nd, (3) 29th, (4) 36th, and (5) control, no fertilizer. The effect of the treatment was analysed by studying the growth and development of the ear initials every 6 days (according to the author's method worked out in 1950–2). The final analysis of the ear initials on the main stem of Tulun-70 was completed on the 43rd day (after sowing), at which time the subsequent phase of flower initiation began. The data show that variant (1) was the most effective, 51 ear initials being established per plant compared with 45, 41, 29 and 12 for variants (2), (3), (4) and (5), respectively. For the variety Kahetinskaja, the most effective period was variant (2). This is explained by the fact that in the branched Kahetinskaja, ear initiation is 6 days later than in Tulun-70. Furthermore, this branched variety is distinguished from Tulun-70 in having a second critical period in regard to supplementary nutrient requirements, namely, at the phase when ear protuberance is completed and before the ears on the branches of the main stem are initiated.—M.H.

925 YAN, Y. R. and PAO, W. K. **Fertilizers in relation to the growth and development of crop plants. 5. On the relative growth in wheat plant.** [Chinese] *Acta bot. sin.* 1957, **6,** No. 3, 235–44, bibl. 4, English summary. [Acad. Agric. Sci., Peking]

The growth of roots, shoots and grains in wheat as measured by dry-matter accumulation, was studied. This growth followed closely an S-shaped curve. At least 58–75% of dry matter in grains was transferred from material accumulated in leaves and stems before heading. The application of NK fertilizers at beginning of shooting lowered the dry-matter accumulation in the roots but stimulated it greatly in the shoots. Thus, the relative growth rate between root and shoot was lowered significantly by manuring at that time. To secure good yields, optimum rates of fertilizers should be applied both before sowing and a little after the beginning of shooting.—E.B.O.

926 MANN, H. S. **Studies on the effect of different levels of moisture and nutrients on wheat. 3. Effect on dry weight accumulation, net assimilation rate and leaf area.** *Indian J. Agron.* 1957, **2,** No. 2, 63–79, bibl. 19. [Indian Agric. Res. Inst., New Delhi]

There were 6 nutrient treatments (control, N, P, K, NP, and NPK) and 2 moisture levels (low and medium) in the field and 3 in the greenhouse studies. The effect of the nutrient- and moisture-treatments, singly and combined, on dry-matter accumulation, net assimilation rate and leaf area are tabulated. Dry-weight accumulation was influenced to a greater extent by moisture level than by nutrients. (It was greater at medium than at low levels). Leaf area increased until earing was complete, except under control and P treatment, when the maximum leaf area (a lower maximum) was reached 10 days earlier. Leaf area was greatest under NPK and NP and under medium- than low-moisture levels. The effect of the treatments on net assimilation rate was variable.—D.B.

927 MORGAN, D. G. and MEES, G. C. **Gibberellic acid and the growth of crop plants.** *J. agric. Sci.* 1958, **50,** Pt 1, 49–59, bibl. 12. [Imp. Chem. Ind., Jealott's Hill Res. Sta., Berks]

Gibberellic acid applied in spring at 2 and 4 oz./ac. to winter wheat, var. Atle, stimulated culm-growth during the first 3 weeks after treatment, but later, differences between treated and control plots disappeared. Grain yield was slightly, but significantly, reduced by treatment ; straw weight was unaffected. Application of a compound fertilizer markedly increased grain and straw yields. Similar treatment of wheat, var. Hybrid 46, in which the top growth was cut off all the plots 22 days later to represent a spring grazing resulted in an increased yield of foliage at this cut, but in reduced grain yield.—M.P. [See also *Fld Crop Abstr.* 10 : 763 and Abs. 1144.]

928 ANDREWS, J. E. **Controlled low temperature tests of sprouted seeds as a measure of cold hardiness of winter wheat varieties.** *Canad. J. Pl. Sci.* 1958, **38,** No. 1, 1–7, bibl. 11, illus. [Canada Dep. Agric., Lethbridge, Alberta]

Twenty winter-wheat varieties were tested for coldhardiness in the sprouted seed stage. Their relative coldhardiness at this stage was in close agreement with their relative coldhardiness in freezing tests of young plants and with their winter-hardiness in the field. Testing by the procedure outlined is apparently a reliable method for testing coldhardiness. It permits the testing of a large number of varieties in a limited space. [See also electrical resistance index method of Greenham and Daday, *Fld Crop Abstr.* 11 : 376.] F.S.—D.B.

929 FOGLIANI, G. Ricerche sulla patologia da basse temperature nel frumento. [**Investigations on low-temperature pathology in wheat.**] *Ann. Fac. Agr., Milano* 1956 (1957), **5,** 241–67, bibl. 9, illus.

As a result of observations made, principally on the variety S. Pastore during 1949–57, the symptoms caused by low temperature in wheat are described.—E.B.O.

930 SANDHU, A. S. and LAUDE, H. H. **Tests of drouth and heat hardiness of winter wheat.** *Agron. J.* 1958, **50,** No. 2, 78–81, bibl. 9, illus. [Kansas Agric. Exp. Sta., Manhattan]

Seeds of 5 winter-wheat varieties were sown in a greenhouse in October and exposed to external winter conditions when they were at the 3-leaf stage. During late December and early January some plants were exposed in the laboratory to temperatures of 132–134°F. for 24–26 hr. ; other plants were exposed to temperatures of 96–108°F. and deprived of moisture. Field trials were conducted with the 5 varieties under conditions of drought and of adequate soil moisture. Rates of drying of cut plant tops at the winter- and spring-growth stages were also evaluated. KanKing wheat showed the highest resistance to experimentally induced heat and drought, the slowest drying rates at both the winter- and spring-growth stages, and the highest grain yields under conditions of drought. The varieties Kiowa, Yogo, Sioux and Ponca ranked in the same descending order for nearly all the characteristics investigated. Under adequate soil-moisture conditions no significant differences in grain yields were observed between the 5 varieties. KanKing had a greater root/top ratio at all stages of growth than had the other varieties.—R.B.

931 LI, S. J. and YIN, H. C. **The effect of light on the formation of starch from sucrose in leaf disks.** [Chinese] *Acta bot. sin.* 1957, **6,** No. 3, 201–16, bibl. 30, English summary. [Inst. Pl. Physiol., Acad. Sin., Shanghai]

Leaf disks of wheat and maize formed several times more starch in light than in darkness.—E.B.O.

932 CARLES, J. and others. Recherches sur les facteurs physiologiques de la verse du blé. [**Investigations into the physiological factors of lodging in wheat.**] *C. R. Acad. Agric. Fr.* 1957, **43,** No. 16, 834–42, bibl. 7.

This study was carried out with lodged- and standing-plants of the wheat variety Étoile de Choisy, growing in the same area in good, well-manured soil in the Toulouse region, France. Each internode of a stem was measured and weighed, and organic-N, P, Ca, Mg and Na were determined for each internode and for whole stems. The average weight of a mm. of internode was used for estimating stem strength. Although lodging is caused by weakness of the lower part of the stem, lodged plants were generally more developed than standing plants and their lowest internode in particular was longer, thicker and heavier than that of standing plants. It is concluded that the cause determining lodging intervenes after the lowest internode has elongated and consists in an excessive formation of organic nitrogenous substances (formed from nitrates) and a reduced formation of carbohydrates (formed by photosynthesis). The same co-enzymes are required for these 2 processes. If photosynthesis is active, a depletion of carbohydrates does not occur and the wheat does not lodge, but if the weather is dull and nitrates are abundant, the formation of organic nitrogenous substances prevails over that of carbohydrates and activates the utilization of available carbohydrates, with the result that the wheat lodges.—E.B.O.

933 LIVENS, J. Le rendement du froment en fonction du pH et de la teneur en K. [**The yield of wheat as a function of the pH and K content.**] *Agricultura, Louvain* 1956, **4,** No. 1, 81–98, bibl. 2, English summary. [Seen Feb., 1958]

The optimal soil pH value for growing wheat is 7·0–7·4. With values lower than 6·5 a high content of exchangeable K has a depressing effect on yield. At pH values higher than 7·9, yield decreases in soil low in K. F.S.—E.B.O.

934 LOIZIDES, P. A. **Fertilizer experiments in Cyprus. 2. Cereals.** *Emp. J. exp. Agric.* 1958, **26,** No. 101, 25–33, bibl. 6. [Dep. Agric., Nicosia, Cyprus]

Results of N- and P-fertilizer trials with wheat and barley are reported and discussed.—M.P.

935 KHAN, A. R. and MATHUR, B. P. **Effect of burying sannhemp as green manure on the yield of wheat.** *Indian J. agric. Sci.* 1957, **27,** No. 2, 171–6, bibl. 9. [Indian Agric. Res. Inst., New Delhi]

Success in green manuring depends on the correct timing of the interval between sowing of the green-manure crop, ploughing-under, and sowing of the wheat crop. Highest yields were obtained with an 8-week interval between each operation. This gave about 400 lb. grain per ac. more than intervals of 4, 6 or 10 weeks.—D.B.

936 PAPAVIZAS, G. C., and CHRISTENSEN, C. M. **Grain storage studies. 26. Fungus invasion and deterioration of wheats stored at low temperatures and moisture contents of 15 to 18 per cent.** *Cereal Chem.* 1957, **35,** No. 1, 27–34, bibl. 8, illus. [Minnesota Agric. Exp. Sta., St. Paul]

White wheat inoculated with deleterious fungi and stored at a moisture content of 15·0–15·5% for 12 months at 5° and 10°C. neither deteriorated in quality nor decreased in viability. Inoculated wheat stored under similar conditions at a moisture content of 16·0–16·5% decreased in

viability and the embryo in many seeds turned brown. Inoculated wheat stored at a moisture content of 16–18% for 19 months at –5°C. was not invaded by fungi and did not decrease in viability ; similar wheat stored at 5 and 10°C. was invaded by fungi ; the embryo in many seeds turned brown and died. Non-inoculated controls which remained free from storage fungi remained sound and viable. F.s.—R.B.

BUCKWHEAT

937 Lewicki, S. and Ruszkowski, M. Studia nad gryka. Cz. 1. Biologia kiełkowania gryki (*Fagopyrum esculentum*). **Studies on buckwheat. 1. The biology of buckwheat germination.** *Hodowla Roslin, Aklim. Nasienn.* 1958, **2**, No. 1, 67–88, bibl. 14, Russian and English summaries.

Observations made under field conditions during 1949–56 have shown that : (1) the seed germinates best at 25 or 26°C., and a variation of only ± 1° exerts a negative influence on germination ; (2) the seed does not sprout at 0 – 4°C. but from 4 to 10°C. sprouting may occur in 60 days, and at higher temperatures (16–24°C.) in 10 days ; (3) sowing at a depth below 6 cm. retards sprouting by 3 – 13 days compared with seeding at 1–5 cm. ; (4) at high temperatures (18–22°C.) and with high rainfall [amount not stated] seedlings develop 5 or 6 days after sowing. F.s.—M.H.

938 Chkolnik, M. J. and others. Le rôle physiologique du bore chez la plante. **[The physiological role of boron in the plant.]** *Rev. gén. Bot.* 1957, **64**, No. 766, 642-52, bibl. 49.

Trials with buckwheat showed that the application of boron to the soil caused an appreciable increase in the synthesis of saccharose and its translocation from the leaves and stems to the flowers. The saccharose content in the flowers of plants which had received boron, was 2·5–6 times higher than in the plants which had received none. It is concluded that saccharose has a great influence on the formation of the reproductive organs.—F.s. E.B.O.

939 Shishido, H. and Honma, R. **On the foliar application of the nutrient to the buckwheat cultivated in the soil of the sand dune. 1. Spraying crop's foliage with urea and potassium phosphate.** [Japanese] *Bull. Yamagata Univ. (Agric. Sci.)* 1957, **2**, No. 3, 139–60, bibl. 60, English summary.

OATS

See also Abs. 1056, 1057, 1058, 1059, 1063, 1070, 1306, 1307, 1324, 1325

940† Dorschner, K. P. and Buchholtz, K. P. **Interception of herbicidal sprays by oats and its relation to alfalfa stands.** *Weeds* 1957, **5**, No. 4, 342–9, bibl. 7. [Wisconsin Agric. Exp. Sta., Madison]

Oats and lucerne were sown together and treated when the oats were 8 in. high in 1952 and 12 in. high in 1953 with 0·25, 0·5 and 1 lb. a.e. of 2,4-D triethanolamine salt/ac. in 5, 10, 20 and 40 gal. water/ac., using a spray pressure of 40 lb. sq. in. In 1952, the percentages of 2,4-D intercepted by the oats were 54, 40, 38 and 40, respectively, where 5, 10, 20 and 40 gal. spray vol./ac. were used ; in 1953, respective percentages were 29, 26, 21 and 9. The leaf canopy of oats in 1952 was denser and higher than in 1953. Lucerne stands in 1952 and '53 averaged 48, 51, 41 and 38% of those of untreated controls where 5, 10, 20, and 40 gal. spray/ac. were used, respectively. In a second series of trials, studies were made on the effect of different heights of oats on the protection from herbicides afforded to undersown lucerne. Rates of 0·25, 0·5 and 1 lb. herbicide/ac. applied to oats, 6, 12 and 18 in. high resulted in average reductions in spray volume at the level of the undersown lucerne of 6·6, 26·2 and 32·6%, respectively, in 1952 and '53. Stand reductions in lucerne were least where the herbicides were applied to oats 12 in. high ; lucerne seedlings in oat crops at this stage of development were not reduced in vigour, nor had shading increased the wettability of their leaves.—P.J.B.

941 MacLaren, R. B. and Carson, R. B. **Yield and chemical composition of oats when harvested at four stages of maturity.** *Canad. J. Pl. Sci.* 1958, **38**, No. 1, 12–15, bibl. 7. [Canada Dep. Agric., Ottawa, Ont.]

Yield and chemical composition of 3 varieties of oats harvested at 4 stages of maturity were studied over a 4-yr. period. Yields increased as harvesting was delayed from " early dough " to " late dough " and to the " ripe " stage, but decreased when the grain was over-ripe. Percentage of hull decreased with increasing maturity at harvest. There were no significant differences in the proximate constituents, nor in Ca, P and Mg when the grain was harvested at different stages of maturity, but K was significantly lower at both the ripe and over-ripe stages. F.s.—D.B.

942 National Institute of Agricultural Botany, Cambridge. **Varieties of oats.** *Fmrs' Leafl. 13 N.I.A.B.* 1958, pp. 4.

The spring oats recommended for Britain are the varieties Blenda, Sun II, Opus II, Maldwyn and Milford. The recommended varieties of winter oats are Powys, S147, Picton and S172. Notes on each are given.—M.P.

943 Ministry of Agriculture, Northern Ireland. **Reports from the counties. Oat variety trials.** *Mon. Rep. Minist. Agric. N. Ire.* 1958, **32**, No. 10, 301–3.

Results in 1957 show that Forward continues to be the leading low-land oat variety ; it was

followed closely by Steel and Marne. Libertas maintained its promise from earlier trials. Of the high-land varieties, Albyn Donside yielded well but the grain and straw were of poor quality. On average over 4 years Stormont Grandee gave the most yield of grain and straw.—M.P.

944 Minister of Agriculture, Canada. **Oat varieties.** *Rep. Minist. Agric. Canada 1956–7*, 1957, 88–9.

Shield, a new, early-maturing oat variety, with resistance to stem rust, crown rust and smut and with good agronomic characters, was released for 1957 sowings to N. and E. Ontario and N.W. and W. Quebec. Fundy, a new, early oat for the Atlantic Provinces, will provide better kernel characters than Ajax.—D.B.

945 Kinch, R. C. **Off-type seeds in newly released oat varieties.** *Proc. Ass. off. Seed Anal. N. Amer.* 1957, **47**, 94–5. [S. Dakota State Coll., Brookings]

Variations due to climate were found in 3 new oat varieties grown in S. Dakota. Ransom oats when ripened under hot, dry conditions were yellow in colour; under cool, moist conditions they produced a number of seeds with grey prominently dark-nerved lemmas and paleas. Newton ripening under cool, moist conditions produced a few dark-glumed seeds. Garry produced a few wild-type plants under cool, moist conditions, but no wild or intermediate types under hot, dry conditions.—R.B.

946 Ruan, E. and Frey, K. J. **Effect of heat treatment on oat seeds.** *Proc. Iowa Acad. Sci.* 1957, **64**, 139–48, bibl. 6. [Iowa Agric. Exp. Sta., Ames]

Oat seeds of the varieties Mo. 0–205 and Sauk were subjected to high temperatures for varying lengths of time in sealed containers or in porous bags. Percentage germination and seedling vigour determinations were made on both treated and untreated seed. Drying temperatures up to 105°F. caused no reduction in viability when the initial grain moisture content was 40% or less. Grain containing no more than 22% moisture could be dried safely at 125°F. Seedling vigour was unaffected by either treatment. Grain of up to 30% moisture content was treated in sealed containers for 20 hr. with no loss of viability or seedling vigour. Temperatures of 149°F. were lethal to grain containing more than 20% moisture, and 176°F. was lethal to all seeds treated. F.S.—R.B.

947 Abrams, R. and Frey, K. J. **The relationship between moisture content and X-ray sensitivity of oat seeds, *Avena sativa*.** *Proc. Iowa Acad. Sci.* 1957, **64**, 155–9, bibl. 3. [Iowa Agric. Exp. Sta., Ames]

Hexaploid oat seeds with moisture contents of 5, 13·8 and 18·2% were subjected to X-ray intensities from 15,000 to 40,000r. The treatment affected seedling vigour and percentage germination to a greater extent where the moisture content was 5 or 18·2 than at 13·8%. The extent of damage to seeds containing 5% moisture was less dependent on the radiation intensity than that of the other samples. F.S.—R.B.

948 Leefe, J. S. [Summarizer] **[Control of] Biennial and annual weeds.** [5 abstracts] *Res. Rep. Nat. Weed Cttee, E. Sect.* [*Canada*] 1957, 90–3.

In trials at Ste-Anne de la Pocatière, Quebec, MCPA at 8 or 12 oz. a.e. of amine/ac., applied when the oats were in the 4-leaf stage, effectively controlled *Spergula arvense*, *Stellaria media* and *Galeopsis tetrahit*. The 8-oz. MCPA/ac. rate significantly increased oat grain yields.—P.J.B.

949 Greb, H. Der Einfluss tiefer Temperatur auf die Wasser und Stickstoffaufnahme der Pflanzen und ihre Bedeutung für das 'Xeromorphieproblem'. [**The effect of low temperature on water- and nitrogen-uptake by plants and its significance in the problem of xeromorphy.**] *Planta* 1957, **48**, No. 5, 523–61, extensive bibl., illus. [Bot. Inst. Landw. Hochsch., Stuttgart/Hohenheim]

The root systems of intact young oat seedlings were halved and placed in nutrient solutions maintained at different conditions of temperature or of N-supply. The temperature conditions compared were : 0 – 2°C. and 15–25°C. ; N was either absent from, or added to, the solution. Temperature was shown to be a more important factor in the subsequent growth of the root systems and seedlings than was the N-content of the substrata. The addition of N to a solution maintained at the low temperature had a far smaller effect on the development of the root system growing in that solution, than on roots where the N had been added to a solution at the higher temperature. N- and water-uptake were less at the lower than at the higher temperature, there was therefore an apparent N-deficiency under conditions of low temperature, and this was reflected by poor root- and seedling-growth —M.P.

950 Martin, P. Die Abgabe von organischen Verbindungen, insbesondere von Scopoletin, aus den Keimwurzeln des Hafers. [**The excretion of organic compounds, particularly scopoletin, by oats' radicles.**] *Z. Bot.* 1957, **45**, No. 6, 475–506, bibl. 31, illus. [Inst. PflSch., Landw. Hochschule, Hohenheim]

The excretion of fluorescent and other organic compounds by rootlets of *Avena sativa* was studied in sterile culture. There was an increase in excretion of scopoletin with rise in temperature. Several compounds were isolated and identified.—M.P.

951 Beckwith, R. S. **Effects of EDTA on the uptake of micronutrient metals by oats from an organic soil.** *Aust. J. agric. Res.* 1958, **9,** No. 1, 13–26, bibl. 25. [C.S.I.R.O., Pl. and Soils Lab., Brisbane]

Amongst the results obtained it was observed that EDTA (the disodium calcium salt of ethylenediaminetetra-acetic acid was used) prevented the occurrence of grey speck disease, whereas addition of hydroquinone failed to do so. Plants treated with hydroquinone contained as much Mn as, or more than, those treated with EDTA.—M.P.

952 Gardner, F. P. and Wiggans, S. C. **Vegetative and floral development of the oat plant as influenced by clipping and nitrogen fertilization.** *Proc. Iowa Acad. Sci.* 1957, **64,** 149-54, bibl. 9, illus. [Iowa Agric. Exp. Sta., Ames]

Spring oats of the varieties Mo. 0–205 and Clintland were sown in soil fertilized with P_2O_5 and K_20, each at 60 lb./ac., either with or without N applied at 100 lb./ac. The plants were clipped at 5 stages of growth : (a) 4-leaf stage, (b) 5-leaf stage, (c) 7-leaf stage, (d) 5-leaf stage with a second clipping 7 days later, (e) 5-leaf stage with clippings 7 and 14 days later. N fertilization and varietal differences had no significant effect on plant height or the time required for the grain to mature. Treatment (a) had no effect on the height of plants at maturity ; (b) and (d) reduced the plant height ; (c) removed the floral primordia; (d) injured the plants so severely that regrowth was negligible. Treatments (a) and (b) slightly delayed maturity, (d) delayed maturity by 10 days. —R.B.

RYE

See also Abs. 1059, 1070, 1184, 1219, 1307

953 Statens Forsøgsvirksomhed i Plantekultur, Denmark. Forsøg med rugsorter 1954–1957. [**Trials with rye varieties, 1954–7.**] *Medd. 588 Stat. Forsøgsvirk. Plantekult.* 1958, pp. 4.

In trials at 10 locations in Denmark during 1954–7 (39 trials), highest average rye yields were given by Petkus, with 37·6 hkg./ha. grain, followed by Sejet Kærne, Borris Perle, Borris Perle 2/50 and Svalöf Kongs II Elite 50, with 37·6, 37·6, 37·3 and 36·6 hkg./ha., respectively. In 29 trials during 1954–6, grain yields of Svalöf Kongs II Elite 48 and Svalöf Kongs II Elite 50 averaged 35·7 and 35·6 hkg./ha., respectively. In 19 trials during 1956–7, the mean grain yield of Svalöf Værne was 38·8 hkg./ha., compared with 38 hkg. for 5 varieties. Brief notes are given on the varieties tested. [See also Abs. 57.]—P.J.B.

BARLEY

See also Abs. 908, 934, 1023, 1027, 1032, 1039, 1056, 1057, 1058, 1059, 1060, 1063, 1070, 1234, 1306, 1307, 1325

954 The Farmers Weekly. **Trouble brewing.** *Fmr's Wkly, Lond.* 1958, **48,** No. 8, 89–91.

The generally high content of N in samples of malting barley grown during the 1957 season in Gt Britain is discussed and possible reasons for it are considered in the light of data given by E. J. Russell and L. R. Bishop in *J. Inst. Brew.* 1933, Vol. 39, p. 287. Factors conducive to high N contents in barley are listed as: (a) late cultivation, (b) late sowing, (c) dry weather during late spring, (d) soil rich in organic matter, (e) acid soil, (f) late top-dressings with N-fertilizer, (g) increasing the total amount of N-fertilizer applied beyond a certain point. The main factor responsible in 1957 for high N contents in malting barley was considered to be (c).—P.J.B.

955 Kreeb, K. Hydratur und Ertrag. [**Soil moisture and yield.**] *Ber. dtsch. bot. Ges.* 1957, **70,** No. 3, 121–36, bibl. 24, illus. [Bot. Inst., Coll. Agric., Abu Ghraib, Iraq]

In studies with barley during 1955–6 it was shown that as the osmotic value of the plant rose the yield declined : grain number per ear was lower, but the 1000-grain weight varied little. Sprinkler irrigation was better than flood irrigation, because less water was required, soil structure was damaged less, leaching took place more slowly and growing conditions for the crop were better. The osmotic value was lower in plants on the sprinkler-irrigated plots and yields were higher. The final moisture content of the soil was the same under both types of irrigation.—M.P.

956 National Institute of Agricultural Botany, Cambridge. **Varieties of barleys.** *Fmrs' Leafl. 10 N.I.A.B.* 1958, pp. 4.

Notes are given on the winter barley variety Pioneer and on 10 spring barleys, for special or general use, recommended for Britain. Of these, Herta is becoming outclassed.—M.P.

957 Ministry of Agriculture, Northern Ireland. **Reports from the counties. Barley variety trials.** *Mon. Rep. Minist. Agric. N. Ire.* 1958, **32,** No. 10, 304–5.

In trials at 11 centres in 1957, the varieties Bonus, Proctor, Carlsberg and Freja continued to yield well. Rika and Domen, recent introductions, yielded least.—M.P.

958 Wilten, W. De veldproeven in 1957. **Field experiments with spring barley in 1957.** *Jaarb. NaCoBrouw* 1957, **22,** 81–94, English summary.

The quality of Proctor barley suffered more as a result of artificial lodging than did that of Carlsberg and Balder. Yields of Balder, a good tillering variety, were not increased by increasing the sowing rate. Domen, which does not tiller well, gave higher yields with a higher sowing rate, but no higher than those of Balder. An experimental field in Limburg, outside the Netherlands malting-barley district, produced a spring-barley crop of

very good yield and quality. The varieties tested there were Balder, Proctor, Carlsberg and Wisa. F.S.—R.B.

959 Coenradie, J. Proefmoutresultaten van enige rassenproefvelden van oogst 1956 en oogst 1957. **Results of micro-malting 1956 and 1957.** *Jaarb. NaCoBrouw.* 1957, **22,** 95–9, English summary.

Proctor barley had better malting qualities than Carlsberg. The malting qualities of Ingrid were intermediate between those of Carlsberg and Proctor. F.S.—R.B.

960 Bendelow, V. M. and others. **Malting quality of Canadian barleys. 7. Parkland.** *Canad. J. Pl. Sci.* 1958, **38,** No. 1, 88–93, bibl. 11.

The variety Parkland, which was licensed for sale in Canada in 1956, is equal to O.A.C. 21 in malting quality. It has the advantage of yielding a higher malt extract. F.S.—D.B.

961 Day, A. D. **Yield and quality of spring malting barley varieties grown as winter annuals under irrigation.** *Agron. J.* 1958, **50,** No. 2, 68–71, bibl 10. [Arizona Agric. Exp. Sta., Tucson]

The malting barley varieties Atlas 46, Hanna, Hannchen, Heines Hanna, Moravian, Tennessee Winter, Atlas 54, Betzes, Brandon 3833, Husky, Kindred, Montcalm, Traill, N.D. B104, O.A.C. 21, Oderbrucker, Odessa, Rika, SD. 1761 and Liberty, and the feeding barley Arivat (as control) were grown as winter annuals under irrigation during 1954–6, being sown in December and harvested the following June. Yields of malting barley ranged from 2242 to 5804 lb./ac. Arivat yielded 5812 lb./ac. The highest-yielding 6-rowed barley varieties were Atlas 54, Atlas 46 and Tennessee Winter. The highest-yielding 2-rowed varieties were Betzes, Rika and Heines Hanna. The 6-rowed varieties were more productive than the 2-rowed. All the malting varieties produced grain with a higher weight per bushel than that of Arivat, 2-rowed varieties tending to have a higher test weight than 6-rowed varieties. Most of the malting barley was of suitable grain size for malting. Kindred produced the smallest grain. The Midwest and Canadian 6-rowed barleys had a higher percentage of grain protein and malt protein than the Western 6-rowed and the Hannchen and Hanna 2-rowed barleys. Most of the Midwest and Canadian varieties had a higher diastatic power than the other varieties. Two-rowed barleys had a higher barley-extract percentage than 6-rowed varieties. Mid-western barley varieties had a higher malt diastatic power than Western varieties. Lodging and shattering were not as detrimental in the Coast group of varieties as in the Manchuria group. None of the high-yielding varieties had a high level of all the malting barley characteristics.—R.B.

962 Hewett, P. D. **Effects of heat and loss of moisture on the dormancy of barley.** *Nature, Lond.* 1958, **181,** No. 4606, 424–5, bibl. 2. [Licensed Seed Test. Sta., Christopher Hill, Ltd., Poole, Dorset]

[See also *Fld Crop Abstr.* 10 : 456, and *Nature, Lond.* 178, p. 1359.] The author's tests with dormant grain of Pioneer barley indicate that temperature affects germination capacity, independently of moisture loss, in harvested samples of grain showing dormancy under conditions of seed testing.—M.H.

963 Obolensky, G. Activation des processus fonctionnels (métaboliques et enzymatiques) de l'orge, par les ultrasons. [**Activation of (metabolic and enzymatic) physiological processes of barley by means of ultrasonic waves.**] *Materiae veg.* 1957, **2,** No. 4, 298-335, bibl. 42, illus. [University of Paris]

Seeds of the early barley varieties Rika and Freja were suspended in vats of circulating water at 16–17°C. and subjected to ultrasonic vibrations of 23, 240, 412 and 950 kcs. at 1–6 w./sq. m. for periods ranging between 5 and 20 min. Absorption of water was 10–12% greater in seeds treated with ultrasonic waves than in the controls. Where 5% methylene blue was dissolved in the water, significantly more of the dye was absorbed by the treated seeds. Treated seeds allowed to germinate in a constant-temperature, constant-humidity enclosure germinated more quickly and vigorously than untreated seeds. Germinating seeds were transferred on the 4th or 5th day after soaking, to culture solutions containing 0·1 mc. of ^{32}P and allowed to develop for 24, 48 or 72 hr. After washing, they were incinerated. Radioactivity in the ash of seedlings treated with ultrasonic waves was greater than in the controls, indicating greater metabolic activity in the treated seed. Soaked seed was treated with ultrasonic waves, restored to its original water content by desiccation, and the evolution of heat assayed by microcalorimetric means. Treated seed and control seed suddenly began to evolve heat after 15–16 hr., except seed treated at 720 kcs. and 3 w./sq. cm. for 15 min., which began to evolve heat only after 22 hr. All treated seed evolved heat more rapidly than the controls. For treatments of less than 15 min., the amount of heat evolved increased with increasing dosages, while for longer treatments evolution of heat showed a net decrease. Ultrasonic treatments for 5 and 10 min. at 960 kcs. caused significant increases in α-amylase activity and increased cellulase activity.—R.B.

964 Ibaraki, K. **Studies on submerging injury of naked barley and wheat. 4. Submerging injury of naked barley on heading stage.** [Japanese] *Proc. Crop Sci. Soc. Japan*

1957, **26**, No. 2, 117–18, English summary. [Kyushu Agric. Exp. Sta.]

The injurious effects of submergence, during 8, 16 and 24 hr., on floral morphology, fertility and subsequent grain yield were studied. Grain yields were reduced respectively, to 53, 20 and 23% of the yield of control plants and the reductions were caused by failure of the reproductive mechanisms. F. Eng. s.—D.B.

965 JOHNSON, L. P. V. and TAYLOR, A. R. **Note on the effect of photoperiod and temperature on the development of spike primordia in barley.** *Canad. J. Pl. Sci.* 1958, **38**, No. 1, 122–3.

An experiment was designed to show the influence of photoperiod and temperature on the development of spike primordia in spring barley. Seedlings of 9 varieties ranging from early- to late-maturity were grown under 6 photoperiod-temperature conditions : 55, 65, and 75°F. each combined with a photoperiod of 13 and 17 hr. Examination of seedlings at 9, 12 and 16 days after sowing showed that spike-primordium initiation coincided with the appearance of the 5th leaf. The lengths of spike primordium at 12, 29 and 43 days after sowing in seedlings representing each variety grown under each of the 6 treatments are tabulated. The most significant feature of the table is the relatively great difference in primordial lengths as between the 2 photoperiods.—D.B.

966 BISHOP, L. R. **Ultra-rapid method for measurement of the germinative capacity of barley grain.** *J. Inst. Brew.* 1957, **63**, No. 6, 516–20. [Stag Brewery, Pimlico, London]

The method described uses 2-(p-iodophenyl)-3-(p-nitrophenyl)-5-phenyl tetrazolium chloride (iodo-nitro-tetrazolium), rather than 2,3,5-triphenyl tetrazolium, because of its relative insensitivity to light and its rapid action. In comparisons with the peeling method for indicating the germinative capacity of a wide range of barley samples, this staining method gave reasonably accurate results in the range 95 – 100% germination. As germination percentages fell progressively below 95%, the discrepancies between the staining and peeling methods increased. The staining method gave results which agreed well with the peeling test in relation to samples damaged by damp storage, or ageing. It is concluded that the staining method is both rapid and reliable enough to be used as a guide in the purchase of malting barleys.—P.J.B.

967 BELL, G. D. H. **Grain-quality – a genetic and plant-breeding character. 2. Barley.** *Agric. Rev., Lond.* 1957, **3**, No. 7, 10–20, bibl. 19. [Plant Breeding Inst., Camb.]

Literature on the prediction of malting qualities of barley varieties from grain characters such as N content, carbohydrate composition and 1000-grain weight is reviewed. Malting tests have until recently been made late in the plant-breeding programme, but a laboratory-scale test has now been devised which can be used on the produce of small-scale plot trials.—A.M.H.

968 HAMY, H. Relation entre la croissance et la concentration de certaines substances contenues dans les plantes. [**Relationship between growth and the concentration of certain substances in plants.**] *Ann. agron., Paris* 1957, **8**, No. 3, 467–77, English, Russian and German summaries. [Sta. Agron., Chateauroux, France]

The results from a study, carried out mainly with barley, showed that : (a) dry weight of barley (aerial part) varied inversely with the concentration of substances precipitating with phosphowolframic acid (N determination) after purification with trichloracetic acid ; (b) intensity of the colour of the trichloracetic-acid extracts (brown and red) decreased with increasing dry weights ; (c) curves expressing dry weight as a function of P_2O_5 concentration in the trichloracetic-acid extract were hyperbolic in respect of young plants, characterized by the fact that the P_2O_5/dry-weight ratio as a function of P_2O_5 gives a straight line.—E.B.O.

969 BAKHTEYEV, F. Kh. **A fossil form of cultivated barley : *Hordeum lagunculiforme* mihi.** *K. LantbrHögsk. Ann.* 1957, **23**, 309–14, bibl. 18, illus. [Bot. Inst., USSR Acad. Sci., Leningrad]

970 ÅBERG, E. **Wild and cultivated barleys with pedicelled florets.** *K. LantbrHögsk. Ann.* 1957, **23**, 315–22, bibl. 16, illus. [Inst. Plant Husbandry]

This is a discussion of the article by Bakhteyev; see previous Abs.—G.M.R.

971 SLUIJSMANS, C. M. J. De behoefte van zomergerst aan magnesium. **Mg requirement of barley.** *Jaarb. NaCoBrouw.* 1957, **22**, 42–51, bibl. 12, English summary. [Instituut voor Bodemvruchtbaarheid, Groningen, Netherlands]

972 VOGLER, E. La fumure de l'orge de brasserie en Allemagne. [**The manuring of malting barley in Germany.**] *Potasse* 1958, **32**, No. 253, 51–5, illus.

To obtain good yields of malting barley, it is necessary to apply 30–50 kg. of N/ha., and also P and K (the last element has a particular favourable effect on the malting quality of barley). The manuring formula 1–1–2 is recommended.—E.B.O.

973 GRUNES, D. L. and others. **Proportionate uptake of soil and fertilizer phosphorus by plants as affected by nitrogen fertilization:**

1. Growth chamber experiment. *Proc. Soil Sci. Soc. Amer.* 1958, **22**, No. 1, 43–8, bibl. 22. [Agric. Res. Serv., U.S. Dep. Agric.]

Barley was grown on 7 soil types in a constant-temperature room, with a 16-hr. photoperiod. A band of P fertilizer was placed at one side of the plants. Where ammonium sulphate was banded alongside the P fertilizer, P uptake was increased more than where these fertilizers were placed in bands on opposite sides of the plant. Bands of sodium nitrate placed alongside or opposite the P bands were equally effective in increasing P uptake. The effect of N fertilizer in increasing P uptake was associated with increased top- and root-growth and with a decrease in soil pH.—R.B.

974 Coenradie, J. Beluchten van zomergerst in opslag. **Aeration of barley in storage.** *Jaarb. NaCoBrouw* 1957, **22**, 71–5, English summary.

A table is given indicating the maximum permissible relative humidity of air that can safely be used for aerating barley in storage, in relation to the temperature of the air and of the grain.—R.B.

MAIZE

See also Abs. 931, 1211, 1219, 1229, 1231, 1322, 1326

975 Miracle, M. P. **Maize in tropical African agriculture.** *Trop. Agric., Trin.* 1958, **35**, No. 1, 1–15, bibl. 53, illus. [Food Res. Inst., Stanford Univ., California]

Data are presented on geographical distribution, production, yield and consumption of maize in tropical Africa around 1950. Tropical Africa includes East, West and Central Africa and production by these areas was nearly 50%, (*c.*2 million metric tons) over 25% and just under 25% of the total, respectively. Yields ranged from almost nil to over 20 q./ha., but the modal yield was *c.* 5 q./ha. —M.P.

976 Alaggia, H. A. Ensayo de maíz con riego. [**Irrigation trial with maize.**] *Rev. Asoc. Ing. agrón., Montevideo* 1957, **29**, No. 101, 20–4, bibl. 4, English summary.

In a plot trial using the maize hybrid T.C.C.1., irrigation (furrow system) was applied up to field capacity when the moisture content of the soil was two-thirds of that capacity. During the vegetative period there were 278 mm. of rain which were supplemented, in the irrigated plots, by 252 mm. of water. The yield from the irrigated plots was equivalent to 6031–7263 kg./ha. which exceeded by 1454 kg., on average, the yield from the non-irrigated controls.—E.B.O.

977 Crane, P. L. **The use of pre-harvest sprays as an aid in field drying corn.** *Agron. J.* 1958, **50**, No. 1, 35–6, bibl. 11. [Purdue Univ., Lafayette, Indiana]

The treatment of mature maize with the defoliant endothal did not lead to significant increases in the rate of moisture loss in the standing grain in 1953, 1955 or 1956. Hand defoliation produced only a temporary effect in 1955, and a small yet statistically significant increase in rate of drying in 1956. Ears detached from the stalk but with shank and husks intact, dried significantly faster, indicating that a flow of moisture into the ear still occurs at maturity. F.S.—R.B.

978 Italia Agricola. Mais ibrido Maliani. [**Hybrid maize Maliani.**] *Ital. agric.* 1958, **95**, No. 1, 65–6, illus.

The characteristics are given of the new hybrid maize Maliani which yields 25–30% more than the open-pollinated variety Marano Vicentino from which it was bred. Its seed is now distributed in Italy where it can be grown as a principal crop, or as a second crop after wheat. The grain has a high carotene content.—E.B.O.

979 Bruyère, R. Céréales d'altitude. [**High-altitude cereals.**] *Bull. Inform. I.N.É.A.C.* 1958, **7**, No. 1, 53–65, illus. [Sta. d'Essais de Kisozi, Belgian Congo]

Information is given on the growing of maize, wheat and *Eleusine coracana* in the Ruanda Urundi. The use of selected seed, distributed for cultivation mainly at altitudes above 1900 m., has increased yields by about 150% in maize, 110% in wheat and 25% in *E. coracana*. The principal selected maize variety grown is Kisozi 41. The wheat variety 130–1–77, high-yielding and rust-resistant, is now distributed. Two principal types of *E. coracana* are present : Mpfunsi, grown after burning the vegetation, and Agahagarika, grown between other food crops. The varieties Kiega and 1.M. of the Mpfunsi type, and 09 and B.K. of the Agahagarika type are being multiplied.—E.B.O.

980 Voisin, J.-C. Premiers essais intervariétaux de maïs dans le sud-Cameroun. [**First varietal trials with maize in south Cameroons.**] *Riz et Rizicult.* 1957, **3**, No. 4, 163–8, bibl. 7, English and Spanish summaries.

In plot trials with maize using local varieties and varieties introduced from other African countries and from Central America, the varieties from Central America, resistant to rust (*Puccinia polysora*), yielded about twice as much as the susceptible African varieties. Amarillo da Cuba (Cuban Yellow) and Mexican 5 were, therefore, retained.—E.B.O.

981 Viégas, G. P. O milho Asteca. [**The maize Asteca.**] *Agronômico, Campinas* 1957, **9**, No. 7–8, 1–6.

The new maize variety Asteca was selected at the Instituto Agronômico, Campinas, Brazil, from material obtained from Mexico. It is a high-yielding, yellow dent maize suitable for cultivation in São Paulo State, especially for feeding to

animals, as grain. Its seed has now been distributed. Asteca, which yields better than Armour, the variety now generally grown, will eventually replace it.—E.B.O.

982 Neilson, J. J. [Summarizer] [**Weed control in**] **Corn.** [7 abstracts] *Res. Rep. Nat. Weed Cttee, E. Sect.* [*Canada*] 1957, 20–4.

1. A study of some pre-emergence herbicides for maize. The following were applied in 30 gal. spray volume/ac. to maize one day after sowing : CMU, ethyl N,N-di-n-propylthiolcarbamate, CDAA, 2,4-D and simazin. Only CMU and simazin treatments gave adequate weed control. Simazin at 1, 2, 4 and 8 lb. active material/ac. resulted in complete control of annual weeds and severe stunting of top- and root-growth in *Agropyron repens* and other perennial weeds.

2. Weed control in maize for silage and sweetcorn. Of a number of herbicides, dinoseb at 5·4 lb. active material/ac. gave best weed control. Simazin at 2 lb./ac. was very promising, while CDAA was only moderately effective.

3. Maize yields and weed control following pre-emergence application of different herbicides. Herbicidal treatments were made to maize just before emergence. Excellent weed control followed the use of simazin. Diuron at 0·75 and 1·5 lb. active material/ac. was also effective.

4. Pre-emergence weed control in field maize. Herbicides were applied to maize 2 days after sowing. Simazin at 2 lb. active material/ac. resulted in complete control of all weeds, except *Agropyron repens*, which was severely checked, and *Echinochloa crus-galli* and *Abutilon theophrasti*, which grew unchecked.—P.J.B.

983 Lee, O. C. [Summarizer] [**Weed control in maize.**] [13 abstracts] *Res. Rep. 14th N. Cent. Weed Contr. Conf.* [*USA*] 1957, 86–93.

In trials in Kansas, simazin at 4 lb./ac. and 2, chloro-4-ethylamino-6-diethylamino-s-triazine at 8 lb./ac., as pre-emergence treatments, gave excellent control of annual weeds, though maize yields were reduced somewhat. In trials during 2 years in Wisconsin on the pre-emergence use of simazin and a number of isomers and other herbicides, simazin, at 4 lb./ac., kept plots essentially free from both grass and broad-leaved weeds during the growing season ; diuron at 2 lb./ac. was also effective. Seasonal variations had little effect on simazin, but greatly influenced the effectiveness of 2,4-D and CDAA. Simazin at rates up to 4 lb./ac. had no apparent effect on maize yields. In trials in Manitoba, pre-emergence treatment with 5 lb. simazin/ac. controlled both broad-leaved and grass weeds and resulted in ear yields 1·5 tons greater than those from untreated controls. In trials in Ohio in which a wide range of herbicides was tested, pre-emergence treatments with CDAA at 2 and 4 lb./ac., simazin at 1 and 2 lb./ac., EPTC at 4 lb./ac. and natrin at 6 lb./ac. all gave at least 90% control of broad-leaved weeds and grass (*Setaria* sp.). Of herbicides applied to maize at emergence, amino triazole at 0·5 and 1 lb./ac. and simazin at 1 lb./ac. were effective. Of treatments at lay-by, only dinoseb at 3 lb./ac. was satisfactory. No treatment adversely affected maize yields. In trials in Kentucky on the control of weeds in maize by early pre-emergence treatments, simazin at 2 and 4 lb./ac. gave complete control of grass and broad-leaved weeds, as did mixtures of 3 lb. CDAA + 0·5 lb. 2,4-D/ac. In trials in Indiana, simazin at 2 and 4 lb./ac. as pre-emergence treatments gave almost complete control of *Setaria faberii* during the growing season. In trials on organic soil, simazin at 4 and 8 lb./ac. as a pre-emergence treatment gave much better control of broad-leaved and grass weeds than the standard treatment with 4 lb. 2,4-D/ac. In trials in Minnesota, pre-emergence treatment of maize, wheat and linseed controlled *Setaria* sp., wild oats, *Amaranthus retroflexus* and *Brassica* sp., but killed the wheat and linseed ; maize was unaffected.—P.J.B.

984 Paixão, J. C. Aplicação de herbicidas em cultura de milho no inverno (nota prévia). [**Application of herbicides to maize crops in winter** (**preliminary note**).] *Portug. Acta biol. Ser. A* 1957, **5**, No. 1, 18–24, bibl. 2, English summary. [Inst. Ecol. Exp. Agric., Rio de Janeiro, Brazil]

In a plot trial to control weeds in maize, ervoxone (2,4-D amine) and arbuxone (2,4,5-T ester) were applied to the soil 2 days after sowing. Observations during July-August showed that ervoxone at a concentration of 5 l./ha. was the most effective treatment and gave good control of weeds with little damage to maize ; it was followed by arbuxone at 2 l./ha. The weed species present are listed.—E.B.O.

985 Messiaen, C. M. and Lafon, R. Les champignons nuisibles aux semis de maïs. 2. Essais de traitements de semences. [**The fungi harmful to maize sowings. 2. Trials in treating the seed.**] *Ann. Épiphyt., Paris* 1957, **8**, No. 2, 209–24, bibl. 3, illus.

Greenhouse- and field-trials to control *Gibberella zeae* attacking germinating maize, showed the effectiveness of several preparations, particularly thiram and the organo-mercury preparations. As a practical measure, it is recommended that thiram be used (50% active principle applied as dust at the rate of 150 g. per 100 kg. of seed, or 75% a.p. at 100 g./100 kg. by the slurry method). This treatment is sufficient in most cases but, in the case of an early sowing or of a poor lot of seed, an additional treatment with an organo-mercury preparation can be given in the week before sowing.—E.B.O.

986 Davide, R. G. **Effects of several fungicides for seed treatment of corn.** *Philipp. Agriculturist* 1957, **41**, No. 6, 295–305, bibl. 10. [Cent. Exp. Sta., College, Laguna, Philippines]

The effectiveness of 7 fungicides and 1 insecticide as seed treatments was investigated using yellow- and white-flint maize sown under dry-season, wet-season and flood conditions. Significantly more plants survived in each of the treated plots than in the control plots 20 days after sowing. The best results were obtained with arasan, followed by granosan, gy-cop, phygon, PCNB, phytomycin, panogen and dieldrin. Increases in maize stands ranged from 23–35% where fungicides were used while the insecticide increased stands by 16%. None of the treatments caused any noticeable damage to the seedlings.—R.B.

987 Berger, K. C. and others. **Boron deficiency, a cause of blank stalks and barren ears in corn.** *Proc. Soil Soc. Amer.* 1957, **21**, No. 6, 629–32, bibl. 9, illus.

Maize plants were grown in a greenhouse in culture solutions in which only B was varied, other nutrients being maintained at adequate levels. B levels were maintained at 0, 0·01, 0·05, and 0·25 ppm. Plants without B and those grown at the 0·01 and 0·05 ppm. concentrations produced only blank stalks or barren ears. Fully developed ears were produced at the 0·25 ppm. concentration when the B level was retained to full maturity only. In field trials, a side-dressing of 15 lb. sodium borate/ac. significantly increased yields at 11% of the fields tested, and wherever blank stalks were present, their number was reduced as a result of the B application. It was concluded : (a) that lack of B can cause blank stalks and barren ears ; (b) that supply of available B must be continuous ; (c) that the critical level of B in the upper leaves appears to be between 11 and 13 ppm. F.s.—R.B.

988 Murty, G. S. and Roy, N. N. **Study of the Indian collections of maize varieties with special reference to the relationship between yield and other characters.** *Indian J. Genet.* 1957, **17**, No. 1, 73–89, bibl. 21. [Indian Agric. Res. Inst., New Delhi]

In 95 varieties of maize, both indigenous and exotic, total correlations were observed between yield and the following characters (in descending order) : weight of ear, length of ear, leaf area, 100-grain weight. F.s.–D.B.

989 Ševčuk, T. N. **Local varieties of Trans-Carpathian cereals.** [Russian] *Vestn. sel'skohoz. Nauki* (*J. agric. Sci., USSR*) 1958, **3**, No. 1, 62–72, illus., English and German summaries.

The data obtained from an expedition to Trans-Carpathia have shown that the ecological conditions which determine the formation of cereal crop types with valuable qualities differ. Local varieties of winter wheat and rye from the valley districts complete the vernalization stage in the course of 30 – 40 days, while mountain varieties require over 40 days to complete this stage. The local varieties of maize from the valley regions (represented by flint, dent or semi-dent types) are distinguished by tall, leafy stalks, long cobs and large grains. When grown under long-day conditions (Puškino, Leningrad region), these varieties show the typical short-day reaction : flowers do not develop. Under the same conditions the mountain varieties flower satisfactorily. The author divides the local varieties of Trans-Carpathian winter wheat and maize into two ecological groups, the valley and mountain types. F.s.—M.H.

990 Petinov, N. S. and Koršunova, K. M. **[The role of the root system in leaf productivity of maize under irrigation.]** [Russian] *Fiziol. Rast.* (*Pl. Physiol., USSR*) 1957, **4**, No. 4, 365–71, bibl. 40, English summary. [Timirjazev Inst. Pl. Physiol., Moscow, and Biol. Inst., West-Siberian Filial Acad. Sci., Novosibirsk]

991 Jenne, E. A. and others. **Change in nutrient element accumulation by corn with depletion of soil moisture.** *Agron. J.* 1958, **50**, No. 2, 71–4, bibl. 11. [Nebraska Agric. Exp. Sta., Lincoln]

Maize was sown in early May in land nearly at field-moisture capacity. Half the plots were irrigated during the growing season, the others were not irrigated. Rainfall during the growing season was 2·5 in. Plant samples were taken at weekly intervals and analysed for plant nutrients. By 21 July the irrigated plants were 72 in. tall and the unirrigated 61 in. On 28 July, when nearly all the available water to a depth of 30 in. had been removed from the soil in the unirrigated plots, differences in dry-matter production and accumulation of N, P and Mg between the 2 treatments were apparent. On 4 August, differences in K- and Ca-accumulation were also apparent. By 27 September the unirrigated plants had accumulated 44, 50, 40, 71, 65 and 93% as much dry matter, N, P, K, Mg and Ca, respectively, as the irrigated plants. Between 4 August and 27 September average dry-matter production of unirrigated plants was greater than average N- and P-accumulation, and there was an 11% loss of K compared with the irrigated plants. Ca-accumulation was influenced very little by the restricted moisture supply. F.s.—R.B.

992 Hiatt, A. J. and Massey, H. F. **Zinc levels in relation to zinc content and growth of corn.** *Agron. J.* 1958, **50**, No. 1, 22–

4, bibl. 7. [Kentucky Agric. Exp. Sta., Lexington]

Maize plants grown in a greenhouse in Zn-free culture solutions showed very severe deficiency symptoms when 38 days old and contained 18 ppm. Zn ; when grown with 0·05 ppm. Zn, plants showed mild deficiency symptoms and contained 9 ppm. Zn ; with 0·14 ppm. Zn, plants were apparently normal and contained 16 ppm. Zn. Similar relationships were observed in maize grown in the field. The explanation of the anomalous results may be that (a) since Zn accumulates in nodal tissue, and stunted plants have a greater proportion of nodal tissue to other tissues than have normal plants, stunted plants would tend to have a high Zn concentration in their aerial parts; or that (b) young plants lose their ability to grow owing to Zn deficiency in the early stages of growth, but continue to absorb Zn after growth has ceased. F.s.—R.B.

993 Elitropi, C. Contributo alla conoscenza della biologia fiorale e della tecnica d'impollinazione artificiale del mais (*Zea mays* L.). 1, 2 e 3. [**A contribution to the knowledge of the flower biology and of the methods of artificial pollination in maize (*Z. mays*). 1, 2 and 3.**] *Ann. Sper. agr.* 1957, **11,** No. 6, 1475–93, and 1958, **12,** No. 1, 5–54, bibl. 26, illus., English summary. [Sta. Sper. Maiscolt., Bergamo, Italy]

In this study, based on data from relevant literature and on original research, the principal aspects of flowering in maize are examined, in particular the effect of climate on the differentiation, growth, development and vitality of the reproductive organs in different types of maize.—E.B.O.

994 Nozzolini, V. Calcolo abbreviato del peso della granella di mais riferito a umidità standard. [**Abridged calculation of the weight of maize grain referred to a standard moisture content.**] *Suppl. to Maydica* 1958, **3,** No. 1, 1–11. [Sta. Sper. Maiscolt., Bergamo, Italy]

A table gives the factors which multiplied by the initial weight of a maize sample give its weight at the standard moisture content of 15·5%, for grain moisture contents of 10–45% (at 0·05 intervals).—E.B.O.

995 Buis, R. Action de l'hydrazide maleique sur le développement du maïs, en rapport avec la concentration et avec l'âge des plantules. [**The effect of maleic hydrazide on maize development in relation to the concentration and to the age of the seedlings.**] *Bull. Soc. bot. Fr.* 1957, **104,** No. 1/2, 33–7, bibl. 9.

Results of experiments in which MH was applied at up to 100 ppm. to irrigated Wisconsin 210 maize seedlings varied with the concentration used and the age of seedlings. MH applied at 50–100 ppm. to 2-week-old seedlings was toxic and brought about marked inhibition of tillering and growth. With older seedlings, 10–100 ppm. MH inhibited tillering, and early growth was uneven, but subsequent flowering was similar to that of untreated control plants.—M.P.

996 Murdock, J. T. and Engelbert, L. E. **The importance of subsoil phosphorus to corn.** *Proc. Soil Sci. Soc. Amer.* 1958, **22,** No. 1, 53–7, bibl. 15, illus. [Wisconsin Agric. Exp. Sta., Madison]

Measurements were made of the recovery of ^{32}P by maize plants from successive 6-in. soil horizons of 4 soil types. In 2 of the soils, more P was recovered from the 6- to 12-in. depth than from the plough layer ; in the other soils P recovery from the 6- to 12-in. layer was almost as great as that from the plough layer. P recovery from any of the other layers was considerably less, but the combined P recovery from these layers was appreciable. In the soils studied, there was more available P present in the plough layer than in any of the other layers, but less than was present in the whole of the subsoil penetrated by maize roots. F.s.—R.B.

997 Younts, S. E. **The influence of chloride in potassium fertilizer on corn [maize].** *Diss. Abstr.* 1957, **17,** No. 11, 2373–4. [Cornell Univ., Ithaca, New York]

998 Fenaroli, L. Problemi tecnici della maiscoltura. [**Technical problems of maize-growing.**] *Maydica* 1958, **3,** No. 2, 35–43, English summary. [Sta. Sper. Maiscolt., Bergamo, Italy]

Data are given for the years 1948–57 in Italy of the total maize area, areas under hybrid maize, total production, unit yields, areas and yields of hybrid seed.—E.B.O.

999 Duncan, W. G. **The relationship between corn population and yield.** *Agron. J.* 1958, **50,** No. 2, 82–4, bibl. 7. [Purdue Univ. Agric. Exp. Sta., Lafayette, Indiana]

A linear relationship was found between the logarithm of the average yield of an individual maize plant and the crop density. Equations capable of giving an accurate estimate of the theoretical optimum density and maximum yield were derived. These equations required only 2 experimental results of yield and density for their solution.—R.B.

1000 Restrepo, L. E. and Ruppel, R. F. La efectividad residual de insecticidas en polvo en la protección de maíz y fríjol almacenados. [**The residual effectiveness of insecticidal dusts for protecting stored maize and kidney-beans.**] *Agric. trop., Bogotá* 1958, **14,** No. 1, 47–50, bibl. 3. [Dep. Invest. Agropec., Minist. Agric. Colombia]

Pyrenone Grain Protectant (a mixture of 0·85% piperonyl butoxide 17 ppm. plus 0·05% pyrethrin 1 ppm.) applied as dust controlled pests, mainly *Sitotroga cerealella*, in stored maize grain during 23 months.—E.B.O.

SWEET-CORN

See also Abs. 982

1001 WARREN, G. F. [Summarizer] [**Weed control in sweet corn.**] [7 abstracts] *Res. Rep. 14th N. Cent. Weed Contr. Conf.* [*USA*] 1957, 132–6.

In trials in Ohio, satisfactory short-term control of grass and broad-leaved weeds in sweet-corn followed pre-emergence and emergence treatment with 3 – 6 lb. dinoseb/ac., with no crop injury. Pre-emergence and emergence treatment in 1956 and '57 with 2 lb. simazin/ac. resulted in good to excellent control of *Setaria* sp., *Digitaria* sp., *Amaranthus retroflexus* and *Portulaca oleracea* for up to 6 weeks. In trials in 1957, simazin applied in July in dry conditions gave only moderate weed control. In trials in Indiana, a number of pre-emergence treatments, including CDEC, neburon, EPTC, simazin and related triazine compounds, were used. Simazin at 4 lb./ac. gave almost complete control of *Digitaria sanguinalis* and *Mollugo verticillata*. Neburon and 2-methoxy-4,6-bis(ethylamino)-s-triazine at 4 lb./ac. effectively controlled weeds, but injured the sweet-corn.—P.J.B.

MILLETS AND SORGHUM

See also Abs. 979, 1322

1002 RASSEL, A. Le mil à chandelles (*Pennisetum typhoides* Burm.) et sa culture au Kwango. [**Bulrush millet (*P. typhoideum*) and its cultivation in the Kwango (Belgian Congo).**] *Bull. agric. Congo belge* 1958, **49**, No. 1, 1–22, bibl. 13, illus., Flemish summary. [Sta. Exp. de l'INÉAC, Kiyaka]

The following information is given on bulrush millet: a practical classification of its types; synonyms; local names in the Congo; description of the plant; biology of flowering; origin of the crop; geographical distribution; adaptation to the ecological conditions in the Kwango; cultural methods including rotation, sowing, harvesting; yields; grain storage; uses; chemical composition of the grain. It is concluded that bulrush millet is the only cereal which is well adapted to the plateaux of the Kwango where, together with cassava, it provides the basic food for the Africans. As its grain contains 10 times more protein than cassava, its consumption should be encouraged.—E.B.O.

1003 ANDERSON, L. E. [Summarizer] [**Weed control in**] **Fall sown grain and sorghum.** [3 abstracts] *Res. Rep. 14th N. Cent. Weed Contr. Conf.* [*USA*] 1957, 83–5.

In trials in Minnesota, treatment of sorghum at the coleoptile stage with 4 lb. dinoseb/ac. gave good control of grass and broad-leaved weeds. CDAA, applied at rates of 4 or 6 lb./ac. as a pre-emergence treatment in the coleoptile stage, or when the sorghum was 6 in. high, gave excellent control of *Setaria* spp. at all rates and dates of treatment; delayed post-emergence treatments caused some injury to the sorghum. In trials in Texas, pre-emergence treatment of sorghum with 4 or 8 lb. 3Y9 (tris (2,4-dichlorophenoxyethyl) phosphite) or 2 lb. monuron/ac., followed by irrigation 2 weeks later, resulted in grain yields of 6203, 4810 and 4043 lb./ac., respectively, compared with 4287 lb./ac. for untreated controls. The herbicides maintained a weed-free condition on the plots during the growth season.—P.J.B.

1004 SHAFER, N. E. **Chemical drying and pre-harvest weed control.** *Res. Rep. 14th N. Cent. Weed Contr. Conf.* [*USA*] 1957, 153–4. [Agron. Dep., Univ. Nebraska, Lincoln]

In trials in Nebraska, Combine 60 sorghum, grown for seed, was treated from the air with desiccants when the grain contained 36–42% moisture. Best results followed the use of 6 qt. PCP in 5 gal. diesel oil/ac. In further trials, 3 grain-sorghum varieties and 10 hybrids were sprayed from the air with 9 desiccants. PCP at 6 qt./ac. in 5 gal. diesel oil gave the best results, but was only slightly better than magnesium chlorate, or S,S,S-tributyl phosphorotrithioate at 6 qt./ac. Redbine 60, Martin, RS650, RS590, Midland and DeKalb D-50 showed the best response to treatment, with moisture losses ranging from 6·5 to 12%; Texas 620 showed almost no response.—P.J.B.

RICE

See also Abs. 1188, 1317, 1330, 1334, 1354, 1355, 1356

1005 DOBBY, E. G. H. **Padi landscapes of Malaya.** *Malay. J. trop. Geogr.* 1957, **10**, pp. 143, bibl. in text, illus.

[See *Fld Crop Abstr.* 10 : 1339.] Details are given of areas which have been studied since the last report.—M.P.

1006 PATRUCCO, G. Risicoltura in Haiti. [**Rice-growing in Haiti.**] *Riso* 1957, **6**, No. 11, 3–6, illus.

1007 VERSCHRAEGE, L. Riziculture dans la vallée de la Ruzizi. [**Rice-growing in the Ruzizi valley (Belgian Congo).**] *Bull. agric. Congo belge* 1957, **48**, No. 6, 1433–43, illus. [Sta. Essais INÉAC, Lubarika, Belgian Congo]

In the Ruzizi valley, rice has so far been grown on a few marshy soils only. The possibility was investigated of growing rice on other types of soil using introduced varieties and new cultural methods. It was concluded that: (a) rice-growing on dry land (i.e. dependent on rainfall) is

impracticable ; (b) in swamps, yields up to 3 metric tons/ha. are obtained but this method is expensive and results are unreliable ; (c) rice-growing under irrigation (an average of 2 irrigations per week) can be introduced in some areas but requires a perfect technique; (d) rice-growing on flooded land (10–20 cm. of water), the best method for this region, gives yields exceeding 5 metric tons/ha. from soils so far considered unsuitable for cultivation.—E.B.O.

1008 LANGFIELD, E. C. B. **Time of harvest in relation to grain-breakage on milling in rice.** *J. Aust. Inst. agric. Sci.* 1957, **23,** No. 4, 340–1, bibl. 4. [Kimberley Res. Sta., W.A.]

The results indicate, with both a long-grained and a short-grained variety of rice, that delayed harvesting leads to a fall in the moisture content of the grain. The proportion of whole grain recovered remained high in both varieties until low grain-moisture levels were reached, when it declined rapidly.—M.P.

1009 DJANG, Y. H. **Irrigation facilities for rice culture in Taiwan.** *Internat. Rice Comm. News Lett.* 1957, **6,** No. 4, 15–20. [Sino-Amer. Joint Comm. Rur. Reconstr.]

Information is given on irrigation facilities in Taiwan which are used mainly for growing rice (the most profitable crop), and which fall into 2 principal categories : the gravity system (by far the more common) and the pumping system. Recent improvements are described.—E.B.O.

1010 OYANGUREN, J. de. Los resultados de los trabajos efectuados por la Estación Arrocera de Sueca en el año 1955. [**The results from work at the rice station at Sueca (Spain) in 1955.**] *An. Inst. nac. Invest. agron.* 1957, **6,** No. 2, 71–223, bibl. 13, illus.

In varietal trials, Fuzisaka, Balilla Double, Razza 77 and Balilla gave the highest yields, all exceeding 6000 kg./ha. ; Razza 77 also gave the highest yield of high-quality grain, followed by Rizzotto, Bersani 2, Arborio and Quarantatre, pp. 71–128. Results are given from a study on germination of rice seeds on (a) a moist substratum, and (b) under 1·5 cm. of water, mainly with regard to the time of emergence of the radicle and the plumule, pp. 129–37.—E.B.O.

1011 MIYAZATO, K. **Studies on the ecological and morphological nature of paddy rice "Taichu No. 65."** [Japanese] *Sci. Bull. Univ. Ryukyus* 1956, No. 3, 123–38, bibl. 5, English summary. [Received Jan., 1958]

Taichu No. 65, the leading variety in Okinawa, is compared with Norin No. 18 and Rikuu No. 132 as regards morphological and physiological changes resulting from transplanting on 11 June instead of on 4 July (which is the standard practice). F.Eng.s.—D.B.

1012 GALLARDO, R. C. **Resistance of lowland rice varieties to rice blast** [*Piricularia oryzae*]. *Philipp. Agriculturist* 1957, **41,** No. 4, 223–30, bibl. 7. [Cent. Exp. Sta., College, Laguna, Philippines]

1013 MULLINS, T. **Economic considerations in the production of short, medium and long-grain rice in northeastern Arkansas.** *Rice J.* 1957, **60,** No. 13, 22–8, illus.

Varieties of rice commonly grown in northeastern Arkansas are : Cody and Caloro (short grain); Zenith (medium grain) ; and Improved Bluebonnet, Bluebonnet 50, and Century Patna 231 (long grain). A table is given showing the comparative yields per acre of these varieties from 1944 to 1955.—R.B.

1014 CHATEAU, R. La lutte contre les plantes adventices en riziculture. [**Control of weeds in rice.**] *Agron. trop., Nogent* 1957, **12,** No. 6, 675–724, bibl. 99, illus., English and Spanish summaries.

This review of recent data from the world literature is concerned mainly with : (a) the botanical composition of the weed flora in rice-fields ; (b) the various methods of control practised (preventive measures, cultural and chemical methods) ; and (c) the methods of applying herbicides. It is concluded that there is no general solution to the problem of weed control in rice-fields because of the diversity in weed species and in natural conditions, and that there are practical limitations to the use of selective herbicides. [The text of (b) and (c) is also reproduced in *J. Agric. trop. et Bot. appl.* 1957, **4,** No. 11.—Ed.]—E.B.O.

1015 IVENS, G. W. **Report on a visit to Sierra Leone. April 15th–June 6th 1957.** *Pest. Abstr. (C)* 1957, **3,** No. 4, 209–23.

Experiments in progress in Sierra Leone on the control of weeds in rice are reported. Ester formulations of 2,4-D in oil applied to the base of mangrove (*Avicenna nitida* and *Rhizophora racemosa*) trunks (at *c.* 200 ml./10-in.-diam. trunk) were best. A 4% solution gave a high percentage kill, even without frilling ; a 1–2% solution sufficed where frilling was carried out. Monuron at 20 lb./ac. was promising. Complete kill of kiri-kiri (*Paspalum vaginatum*) was obtained with 40 and 80 lb. of dalapon per ac. ; 20 lb./ac. gave good control for 6 months, but regrowth occurred.—M.P.

1016 WILLIAMS, O. B. **The effect of irrigated pasture in the rice rotation on seed populations of *Echinochloa crus-pavonis*.** *J. Aust. Inst. Agric. Sci.* 1957, **23,** No. 4, 331–3, bibl. 1. [Reg. Past. Lab., Deniliquin, N.S.W.]

Results suggest that 4 or 5 years of irrigated *Trifolium subterraneum* and *Lolium rigidum* pasture will reduce the number of viable seeds of *E. crus-pavonis* in the soil, whereas in the course of 1 rice

crop the few plants of *E. crus-pavonis* that do grow are able to build up a substantial seed reserve in the soil.—M.P.

1017 Yoshii, H. **Studies on the disease resistance in rice plants.** [Japanese] *Mem. Ehime Univ. Sect. 6*, 1957, **3**, No. 1, 1–142, bibl. 123, illus., English summary.

1018 Abraham, E. V. **Bothered by rats in rice fields ?** *Indian Fmg* 1958, **7**, No. 12, 31–2, illus. [Agric. Res. Sta., Aduthurai, Tanjore]

In the rice fields of S. India the grass rat attacks rice in the seedling stage ; the mole rat appears later and damages the tillers in the shot-blade stage when the stems are sweet. The usefulness and comparative cost of some methods of rat control are discussed. They include the use of zinc phosphide, warfarin, and the Tanjore bamboo trap. This trap is especially recommended. Its construction is described.—D.B.

1019 Pergolani, María J. I. El " varillero " como plaga regional de los arrozales de Santa Fé. [**The thrush, a local pest in the rice-fields of Santa Fé (Argentina).**] *An. Soc. cient. arg.* 1957, **164**, No. 3–4, 96–101.

Information is given on methods used locally for controlling thrushes in rice-fields. Total destruction of these birds is not advocated as they may be useful in controlling a weed of rice [*Echinochloa* sp.] on the seeds of which they feed when rice is scarce. The repellent Morkit was tested recently with good results, but is expensive. It was applied as spray by aeroplane, as dust (1 part Morkit to 5 parts sulphur, or with Folidol), or as a smoke. In the plots treated with the sulphur mixture no bird settled ; in the others they settled but then left without eating. The repellent action was still present after 21 days.—E.B.O.

1020 Hun-Čun' V. and Czun-Ja, L. [**Flooding rice at different phases of its development.**] [Chinese] *Acta bot. sin.* 1956, **5**, No. 4, 399–410, bibl. 26, Russian summary. [Inst. Pl. Physiol., Acad. Sci., China]

1021 Kido, M. and Yanatori, S. **Physiological and ecological researches on rice plant in well-drained and ill-drained paddy field. 1. On the growth and the changes of reserved nutriments in rice grains.** [Japanese] *Bull. Fac. Agric. Niigata Univ.* 1957, No. 9, 7–14, illus., English summary.

The object of the experiments was to obtain fundamental data for developing cultivation techniques which would give yields high in quality and quantity on ill-drained and on well drained fields. Internode length was investigated for its bearing on lodging and the rate of development of lysigenous aërenchyma and of rot in roots, for its effect on 1000-grain weight and weight of panicles per hill. F. Eng. s.—D.B.

1022 Sakai, K.-I. and Uttyamada, H. **Studies on competition in plants. 8. Chromosome number, hybridity and competitive ability in *Oryza sativa* L.** *J. Genet.* 1957, **55**, No. 2, 235–40, bibl. 5. [Nat. Inst. Genet., Misima (K.I.S.) ; Nat. Inst. Agric. Sci., Hiratuka (H.U.), Japan]

Four varieties of the *japonica* rice group were compared, for competitive ability, with their respective tetraploid plants. The tetraploids were always inferior to their diploid prototypes. F_1 hybrids of *japonica*, *indica* and *japonica* × *indica* crosses were often notably superior to both parents. Doubling the chromosome number of the hybrids always decreased their competitive ability.—M.P.

1023 Sakai, K.-I. **Studies on competition in plants. 7. Effect on competition of a varying number of competing and non-competing individuals.** *J. Genet.* 1957, **55**, No. 2, 227–34, bibl. 1. [Nat. Inst. Genet., Misima, Japan]

In trials with races of barley and rice differing in competitive ability it was shown that the effect of competition on a plant was linearly proportional to the number of surrounding competitive individuals. From 1–6 plants around a central plant were used in these studies. In barley, the weight of tops and ears, and the culm numbers of the central plant decreased with increasing numbers of surrounding plants. In upland rice, weight of tops, culm number, panicle number and weight of kernels of the central plant decreased, whereas in red rice these characteristics, together with the number of kernels per panicle and panicle weight, increased as the number of surrounding individuals increased.—M.P.

1024 Nagato, K. and Tanda, Y. **Studies on the qualities of rice kernels.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1957, **26**, No. 2, 85–6, English summary. [Nagoya Univ. ; and Kyoto Liberal Arts College]

Specific gravity of rice grains is a satisfactory indication of quality. F. Eng. s.—D.B.

1025 Kashibuchi, H. **Studies on the flowering and ripening of rice plant. 2. On the percentage and the weight of the perfect kernel in relation to the location of the kernel.** [Japanese] *J. Fac. Agric., Iwate* 1955, **2**, No. 3, 258–64, bibl. 5, English summary.

The rice varieties Rikwu 132 and Fujisaka 5 were used in the studies. The percentage of perfect kernels was higher on the upper than on the lower branches of the panicle. The weight of the perfect kernels tended to increase towards the base of the panicle, and was higher for grains on the primary branches ; that of grains on secondary branches was very low. On primary branches, the percentage of perfect kernels and their weight

decreased slightly from the base to the tip of the branch, on the secondary branches the reverse was the case. The variety Fujisaka 5 was superior to Rikwu 132 in respect of percentage of perfect kernels on the weak spikelets ; it also ripened better but had a lower kernel-weight. F. Eng. s.—M.P.

1026 YAMADA, N. and OTA, Y. **Physiological character of rice seedlings. 2.** *Proc. Sci. Soc. Japan* 1957, **26**, No. 2, 78–80, bibl. 2, Japanese summary. [Nat. Inst. Agric. Sci.]

[See Abs. 139.] This study of the differences in the physiological properties of upland- and lowland-sown rice was continued after transplanting the seedlings. The number of tillers, growth (measured by dry weight), starch content (at transplanting and at stage of minimum starch-content in July), the activity of certain enzymes (starch phosphorylase, catalase and peroxidase), and the Fe content of the leaf were greater in upland- than in lowland-sown plants. N content was the same in both types of plant. Respiration and Mn content were lower in upland- than in lowland-sown plants.—D.B.

1027 FUJIWARA, A. and KADOWAKI, M. **Studies on the metabolism of phosphorus in higher plants. 1. Trends in the distribution of phosphorus in the rice and barley seedlings.** *Tôhoku J. agric. Res.* 1957, **8**, No 1, 55–63, bibl 10. [Fac. Agric., Tôhoku Univ., Sendai, Japan]

The P-distribution in the leaves of rice and barley seedlings grown in water-culture was followed for 30 days after germination. In rice, the P-concentration increased with the age of the seedlings to a maximum 14–21 days after germination. In barley, the P-concentration varied considerably but fell off at the 28th day. Results indicated also that the primary roots of barley functioned for a longer period than those of rice. F. s.—M.P.

1028 ISHIBASHI, H. **On the effect of silica contained in carbonized rice hull on the growth of rice seedlings.** [Japanese] *Bull. Fac. Agric. Yamaguti Univ.* 1956, No. 7, 333–40, English summary.

The application of carbonized rice hulls greatly increased the Si content of rice seedlings. F. Eng. s.—D.B.

1029 FUJII, Y. **Physiological and morphological differences in the roots according to nodes succession in rice and wheat plants.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1957, **26**, No. 2, 156–8, bibl. 6, illus., English summary. [Fac. Agric., Saga Univ.]

Properties of rice- and wheat-roots were correlated with age which was represented by the position of their emergence from the main stem. In rice, the 10th node produced the greatest number of roots (23) and these had the maximum basal diameter (1·36 cm.). In wheat, there were uniformly 3 roots per node and these roots attained their maximum basal diameter (1·26 cm.) at the 6th node. In rice, the younger roots absorbed more O_2 from the soil water than did the older roots. In wheat this difference was less marked. F. Eng. s.—D.B.

1030 AIMI, R. and NAKAYAMA, H. **Rooting ability in rice seedlings under low temperature. 1. Potentiality of re-rooting.** *Proc. Crop Sci. Soc. Japan* 1957, **26**, No. 2, 154–5, bibl. 2, illus., Japanese summary. [Nat. Inst. Agric. Sci., Tokyo]

Re-rooting ability was assessed as the length and number of crown roots which grew from the basal part of the stem after previously existing crown roots had been cut off. Re-rooting of the rice variety Sasashigure was studied anatomically in seedlings which had been grown in (a) upland and (b) lowland nursery beds, and had continued their growth under a uniform temperature of 15–16°C. On determining the number of roots emerging and the number of root primordia observed in transverse sections at the 2-, 3·5- and 5-leaf stages of growth it was found that re-rooting (and other growth phenomena) were more advanced in the upland than in the lowland seedlings. Comparing starch content in the leaf sheath of these 2 types of seedling, the upland- contained less than the lowland-seedlings. It is supposed that the starch is utilized in the production of new roots.—D.B.

1031 YAMAKAWA, Y. and KISHIKAWA, H. **On the effect of temperature upon the division and elongation of cells in the root of rice plant.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1957, **26**, No. 2, 94–5, English summary. [Fac. Agric., Saga Univ.]

The intensity of cell division in the root tip of rice seedlings was greatest at 25°C. and diminished above and below this temperature. It followed a diurnal rhythm, the primary maxima being at 10.0 a.m. and 10.0 p.m. and secondary maxima at 4.0 a.m. and 6.0 p.m. This rhythm was independent of temperature. The elongation of cortical cells was greatest at 30°C. F. Eng. s.—D.B.

1032 SHIMIZU, T. and TSUNO, Y. **Studies on yield forecast in main crops. 2. Photosynthesis of wheat and naked barley under field conditions. 3. Growth of rice plant in relation to its photosynthetic activity.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1957, **26**, No. 2, 100–2 and 103–4, English summaries. [Hyōgo Agric. Sta. and Survey Office]

1033 Murata, Y. and others. **Studies on photosynthesis in rice plant. 7. Photosynthesis of rice plants grown under different conditions in manuring or plant spacing.** *Proc. Crop Sci. Soc. Japan* 1957, **26**, No. 2, 159–64, bibl. 4, Japanese summary. [Nat. Inst. Agric. Sci.]

1034 Yamagata, M. **Studies on the limit of possibility of the increase in number of leaves and grains of the main stem of rice varieties. 1. Effect of temperature and day-length during the nursery period on the number of leaves and grains of the main stem.** [Japanese] *Bull. Fac. Agric. Yamaguti Univ.* 1956, No. 7, 349–54, bibl. 4, illus., English summary.

Sixteen varieties were subjected, during the nursery period of 34 days, to short-day treatment combined with either high or low night-temperature. Early varieties, such as Hayasio, Eikō and Tomoemasari, under high night-temperature, headed prematurely and produced few leaves ; under low night-temperature heading was delayed and there were more leaves. In the middle-season varieties Norin No. 22 and Norin No. 37, there was no heading under high night-temperatures. F. Eng. s.—D.B.

1035 Tang, P. S. and others. **Respiratory pathways in rice seedlings and respiration as an adaptive physiological function of the living plant.** [Chinese] *Acta bot. sin.* 1956, **5**, No. 4, 377–97, bibl. 44, English summary. [Peking Inst. Plant Physiol., Acad. Sin.] [Received March, 1958]

The results are given from a study on the respiratory activity of 5-day-old rice seedlings. These were germinated and kept in darkness at 30°C., and their respiration was measured in air or in N. By feeding with substrates and by using respiratory inhibitors, the pathways of carbohydrate metabolism were followed. The general conclusion is reached that, while the possession of a strong fermentation system enables rice seedlings to withstand anaerobic conditions, the seedlings rely on the aerobic respiratory system for good germination and growth. Flooding and draining of rice-fields should, therefore, be practised with the aim of attaining ample aeration to ensure healthy growth of the seedlings.—E.B.O.

1036 Takeda, T. and Kumura, A. **Analysis of grain production in rice plant. 1. Influence of nitrogen levels on leaf area, photosynthetic ability and respiration rate. 2. Influence of nitrogen levels on light receiving coefficient and dry matter production.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1957, **26**, No. 2, 165–75, bibl. 13, English summary. [Fac. Agric., Tokyo Univ.]

The following formula has been produced to express the dry-matter production of rice growing as a plant community: $\triangle W = k \cdot L \cdot S \cdot p_0 \cdot \rho - Rw$ (k = constant) where $\triangle W$ denotes the dry matter produced per day, L, integrated intensity, S, leaf area, p_0, mean photosynthetic activity per [unit] leaf area under saturating light intensity, ρ, light-receiving coefficient, Rw, dry matter used in respiration. F. Eng. s.—D.B.

1037 Abe, S. and Wada, W. **Effect of night temperature at ear-developing stage on rice plant.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1957, **26**, No. 2, 99, English summary. [Kyushu Agric. Exp. Sta.]

In the warmer districts of Japan, rice plants at the maximum tiller stage which were subjected to night temperatures at least 2°C. above normal gave lower yields than controls while below-normal night-temperatures gave, in some plots, increased yields. The same night-temperature treatment applied at the heading stage gave the opposite results. F. Eng. s.—D.B.

1038 Doi, Y. and Yamagata, M. **Effects of low temperature at night during nursery period on the early-maturing varieties of rice.** [Japanese] *Bull. Fac. Agric. Yamaguti Univ.* 1956, No. 7, 341–8, bibl. 3, English summary.

1039 Fujiwara, A. and Tsutsumi, M. **Biochemical studies of microelements in green plants. 2. The chemical composition of rice and barley affected by iron deficiency.** *Tôhoku J. agric. Res.* 1957, **7**, No. 4, 397–408, bibl. 17. [Fac. Agric., Tôhoku Univ., Sendai, Japan]

[See also *Fld Crop Abstr.* 9 : 730.] Plants were grown in culture solution and the composition of the leaves was followed during several weeks. In the absence of Fe, the total N, P and K concentration rose, but fell when Fe was added to the solution and uptake was resumed. The protein level did not change significantly even when chlorosis was severe. Total sugar and amino-N decreased. In normal and Fe-deficient plants the relative concentrations were similar in the lower leaves but varied in the upper leaves. Mn and Fe were highest in the lower leaves, and lowest in the topmost leaves ; the reverse situation was noted in the case of Zn, Ca, P, Mg and K.—M.P.

1040 Clark, F. and others. **Influence of organic additions and flooding on iron and manganese uptake by rice.** *Agron. J.* 1957, **49**, No. 11, 586–9, bibl. 8. [Soil and Water Conserv., and Crops Res. Div., U.S. Dep. Agric., Beltsville, Md]

Japonica rice varieties grown in greenhouse cultures were tested for vegetative yield and for Fe- and Mn-content to find the effect of organic additions and flooding on rice growth. Davidson silty clay loam and Brookston silt loam were used, both

under lowland (flooded) and upland (field capacity) conditions. The addition of straw to Davidson loam, and flooding for a prolonged period prior to cropping, were injurious to rice yields, the plants being higher in Fe- and lower in Mn-content than the controls. Mn contents of all plants grown submerged for 74 days were high, ranging from 800 to 3300 ppm. The lowland variety Calusa 1600 grown in Brookston loam showed comparable Fe content, but yields under the lowland treatment were higher than under the upland treatment and were accompanied by a Mn uptake 10 times greater than in the upland treatment. Similar results were obtained with the upland variety Korean CI 8649. Addition of Mn with or without Fe were made to Brookston loam. Without Mn, upland yields were lower than lowland. The addition of Mn to upland cultures produced greater yields than untreated lowland cultures. Fe in combination with Mn did not further increase upland yields on Brookston soil. Rice had a high requirement for, and an exceptionally high tolerance to, Mn. F.s.—R.B.

1041 Misra, G. and Sahu, G. **Physiology of growth and reproduction in rice. 1. Effect of plant growth substances on an early variety.** *Bull. Torrey bot. Cl.* 1957, **84,** No. 6, 442–9, bibl. 11. [Ravenshaw Coll., Cuttack, India]

The effect of IAA, NAA and TIBA at 500, 250 and 100 ppm. on the growth and reproduction of the rice var. N. 136 was investigated. IAA had no effect on time of flowering. It had a depressing effect on vegetative characters which was followed by subsequent recovery. IAA increased the number and length of panicles and the number of grains per panicle, bringing about a higher grain yield. NAA caused inhibition of vegetative characters in the early stages and delayed ear emergence ; grain yield was not affected. TIBA had a favourable influence on vegetative characters. Neither flowering nor grain yield was affected, but at 250 and 500 ppm. a marked decrease in grain plumpness was observed. F. s.—R.B.

1042 Ting, T. and Fang, Y. H. **A preliminary investigation on salt tolerance of rice plant.** [Chinese] *Acta bot. sin.* 1957, **6,** No. 2, 91–102, bibl. 10, illus., English abstract. [Inst. Plant Physiol., Acad. Sin., Peking]

In a pot trial, saline water with different concentrations of NaCl was applied to rice plants of the variety Lao Lai Ching at different growth stages. The principal results were : (a) rice plants in early- and late-tillering and shooting-stages were more sensitive to salt than those in heading to flowering and milk-ripe stages, which showed a certain resistance ; (b) treatment of rice plants in early- and late-tillering and shooting-stages with 0·25% NaCl solutions did not reduce yields, but treatment with concentrations higher than 0·50% affected grain yield ; treatment in the early-tillering stage with 1·5% salt water caused death of the plants ; with plants in the heading to flowering and milk-ripe stages, there was a significant drop in grain yield with 2% NaCl solutions only ; (c) analysis for chloride contents in different parts of the plant showed the following order of decreasing concentration : stem, leaf sheath, leaf blade, root and grain. In general, treatment of rice plants in early- and late-tillering- and shooting-stages with salt water up to 1% concentration did not affect the chloride content.—E.B.O.

1043 Kung, P. **The system of rice seed multiplication and extension in Taiwan.** *Internat. Rice Comm. News Lett.* 1957, **6,** No. 3, 9–13.

Rice seed in Taiwan is multiplied by 3 stages : foundation-, stock- and extension-seed. The general practice is to renew the seed after 3 crops (there are 2 rice crops per year in most areas). Lowland rice accounts for 94% of the total rice area, the Ponlai rice (a common name for improved varieties of the *japonica* type) being grown on 55% of the lowland area. Ponlai rice, which yields 10–20% more than the native rice (*indica* type), is multiplied each crop season to provide for renewal of seed on 150,000 ha., or one third of its present area.—E.B.O.

1044 International Potash Institute, Berne. **Rice and its manuring.** 1956, pp. 59, bibl. 18, illus.

Information is given on the following aspects of rice : crop history ; world distribution, areas and productivity ; climate ; soils ; farming systems ; crop rotations ; nutrition ; manuring.—E.B.O.

1045 Indo-U.S. Technical Co-operation Programme. **Co-ordinated fertilizer trials on paddy.** *Stat. News Lett.* 1957, **7,** No. 2, 1–7.

These experiments were part of the first Five-Year Plan and were conducted throughout India. The responses to fertilizer were correlated with broad geographical regions, not with soil groups. Different sources of N and P produced the same response.—D.B.

1046 Williams, W. A. and others. **Green manures and crop residues in managing rice soils.** *Rice J.* 1957, **60,** No. 13, 3, 4, 21. [Rice Exp. Sta., Biggs, California]

Yields of rice have been substantially increased by intersowing inoculated seed of *Vicia atropurpurea, V. sativa, V. dasycarpa, V. faba, Pisum sativum* or *Medicago hispida,* and ploughing-in the legume as green manure during the spring. Chopping the rice straw at harvest and before

ploughing-in enhanced its value as a manure. Straw burning caused serious reductions in yields of rice.—R.B.

1047 Pasfield, D. H. **Some rice storage problems and their solution in Burma.** *Internat. Rice Comm. News Lett.* 1957, **6**, No. 4, 20–3.

This article deals mainly with the technical problems of constructing a storage unit capable of holding 1000 tons of grain—the solution being a timber structure of 140 × 44 ft.—and a silo which was made of sheets of steel mesh lined with hessian. —E.B.O.

1048 Micchiardi, G. Possibilità d'impiego dei raggi infrarossi nella essiccazione del risone. [**Possibility of using infra-red rays for drying rough-rice.**] *Riso* 1957, **6**, No. 11, 7–12, illus.

An account is given of preliminary trials carried out in Italy in 1956 to study the possibility of drying rough rice by infra-red rays. Results indicate that this is economically possible.—E.B.O.

1049 Jamaica Department of Agriculture. Investigations 1955. *Bull. 55 (N.S.) Dep. Agric. Jamaica* Kingston, 1957, pp. 106. [Received May, 1958]

1. Rice variety trials, pp. 17–19. Yields of spring-sown Bluebonnet 50, Sunbonnet, Century Patna 231 and Magnolia were all heavier than those of autumn-sown crops ; almost twice as high in the case of Bluebonnet 50 and Sunbonnet. Highest yields in the spring-sown trial were from Sunbonnet, Bluebonnet 50 and Century Patna 231 and in the autumn-sown trial from Zenith.
2. Rice seed-rate trials, pp. 21–3. The optimum seed-rate for spring-sown Bluebonnet was 100 lb./ac. and in an autumn-sown trial, 80 lb./ac.
3. Potato-blight spraying experiment, pp. 31–2. Copper oxychloride (coppesan ; 0·125% Cu) gave the best control, followed by Bordeaux mixture with triton as a wetting agent.—A.M.H.

1050 Chang, H. T. **Land reform and other factors contributing to rice production increase in Taiwan.** *Internat. Rice Comm. News Lett.* 1957, **6**, No. 3, 1–9.

1051 Sierra Leone Department of Agriculture. **Report for 1956.** Sierra Leone, 1957, pp. 31.

Earlier schemes for increasing rice production in the fertile swamps instead of in upland areas have been replaced by a more ambitious programme for mechanical development. The first three areas so developed have now been handed over to producer co-operatives. Over 12,000 acres were ploughed in 1956. With the progressive movement of rice production to the swamps, weed control problems become more pressing and the demands for fertilizers are increasing.—M.H.F.

1052 Fengchow, C. Ma. **Rice culture implements and facilities in Taiwan.** *Internat. Rice Comm. News Lett.* 1957, **6**, No. 3, 26–34.

The implements used for growing rice in Taiwan are briefly described. A summarized account is also given of recent trials to improve some of these implements and the facilities available for drying and processing rice.—E.B.O.

1053 West African Rice Research Station. **Report for 1956.** London, 1958, pp. 38, illus., 2s. [Rokupr]

1. Arboricide and herbicide trials, pp. 9–15. [See Abs. 1015.]
2. Varietal trials, selections and hybridization, pp. 15–25. Introductions which have shown promise at Rokupr, on riverine flood plains at Musaia and on mangrove land at Shenge Island are listed. The results are given of yield trials with early varieties and early main-crop varieties carried out at Rokupr, also of trials on riverine flood plains. A progress report is given on work with new selections and hybrids.
3. Milling experiments, p. 19. In trials with a Minghetti sampling mill, grain breadth was the only factor in the size of the grain which was sensitive to the setting of the cone in the mill. Since the setting of the cone to this measurement was found to be critical if optimum results were to be obtained with each variety, the mill had to be calibrated for the complete range of grain breadths found among the varieties grown at Rokupr. Under local conditions, the optimum moisture content of the grain for milling was 11–12%.
4. Factors affecting flower opening and anthesis, pp. 25–6. The varieties Lead, HR 22, Tai Chu 65 and Sitpwa C28–15 were used in the study. There was wide plant-to-plant variation within a variety and no correlation between flowering and meteorological data was apparent. Anthesis occurred a few minutes after each flower opened.
5. Factors, other than photoperiodism, affecting the duration [time from sowing to harvest] of rice varieties, pp. 26–7. Nine varieties, which were sensitive, insensitive or had an unknown response to photoperiod were used. In every variety, light intensity affected duration in the same way ; the heavier the shading the greater the delay in flowering. The response was greatest in those varieties which had the shortest time to maturity. Shading also decreased the rate of tiller formation and the final number of flowering tillers formed. The effect of temperature on time to maturity could not be ascertained.
6. Dormancy and viability of rice seed, pp. 27–8. Seed of 4 varieties, stored either in sealed tins at ambient temperature and a moisture content of 11%, or in unsealed tins at 8°C. and *c.* 15% moisture content, maintained their viability at *c.* 100% germination for a year, compared with

50% for the controls under normal storage. The dormancy period was extended by storing the seed at 8°C. (in 1 variety for over 15 months), but not by storage at 11% moisture content and ambient temperatures. Dormancy of seed kept at the low temperature was broken by transferring it to a fluctuating temperature. Storage under moist conditions at 8°C. immediately after harvest, caused dormancy to be broken more quickly than normal. Only seed of Toma 112 was sensitive to light.

7. Seed dressings, pp. 28–9. Treating seed with agrosan GN, didimac dust (containing 5% DDT) or agrocide immediately after harvest had no effect on percentage germination for at least 9 months after treatment, but seed germinating 2 months after dressing with agrocide exhibited stunted roots and swollen coleoptiles ; this effect became more marked with increase in the storage period from time of treatment. The deformity was, however, subsequently overcome and later growth was normal.—M.P.

1054 Matsushima, S. and Tsunoda, K. **Analysis of developmental factors determining yield and yield prediction in lowland rice. 42. On the prediction of the number of spikelets per panicle and that of spikelets per hill (2).** [Japanese] *Proc. Crop Sci. Soc. Japan* 1957, **26**, No. 2, 87–8, English summary. [Nat. Inst. Agric. Sci.]

The method for predicting the number of spikelets per panicle [see Abs. 135] can be applied to rice plants cultivated in different years and, with modifications, to predicting the number of spikelets per hill. F. Eng. s.—D.B.

QUINOA

1055 Gorbitz, R. A. and Luna de la Fuente, R. Estudios sobre la quinua en el Perú. [**Studies on quinoa in Peru.**] *Circ. 72 Esta. exp. agric. La Molina 1957*, pp. 24, bibl. 21, illus., English summary.

This is a review of the literature (not easily accessible) on the agronomy, chemical composition and uses of quinoa (*Chenopodium quinoa*) in Peru. A botanical description is given of this Andine food plant, grown since ancient times at 3000–4000 m.a.s.l. Its average yield is 1104 kg. of grain per ha., but yields exceeding 3000 kg. have been recorded. A programme of studies for improving this crop is indicated. [See also *Fld Crop Abstr.* 9 : 208.]—E.B.O.

GENERAL

1056 Pessi, Y. **On the influence of the time of sowing upon the crop yield of spring cereals.** *Valt. Maatalousk. Julk.* 1957, No. 156, pp. 33, bibl. 24, illus. [Frost Res. Sta., Pelsonsuo, Finland]

In Finland the length of the growing season varies from slightly more than 160 days in the southern areas to 110 days at the northern frontier. While these figures are well above those required for the growth of the latest varieties of spring wheat and oats, there are, however, deviations from the average normal climatic or other conditions which curtail the length of the growing season (frequent night frosts in the late summer, or the longer-than-normal growing period required by cereals on many cultivated bog areas). A study has been made of the effect of time of sowing on spring cereals at the above Station (approx. lat. 64°N., long. 26°E.) during 1951–5. The data show that the best grain yields from oats, spring wheat and barley are obtained from sowings made in early May (barley not later than 20 May and not on wet soil). There is evidence that low soil-temperature during germination is not detrimental to the crops, and that the good grain yields result from the abundance of solar irradiation in the early summer (see also Pohjakallio and Salonen in *Acta agr. Fenn.* 1947, 67, 1–51).—M.H.

1057 Grillot, G. and Cazal, L. Utilisation régionale des variétés sélectionnées de céréales d'automne (blé, orge et avoine). [**Regional use of selected varieties of autumn cereals (wheat, barley and oats).**] *Emp. Chérifien* [Morocco] *Minist. Agric. et Forêts* 1956, pp. 6. [Serv. Rech. Agron., Rabat] [Received March, 1958]

A table shows varieties of soft wheat, durum wheat, barley and oats suitable for different regions of Morocco. For each region the varieties are arranged in order of earliness. For some regions distinction is made between irrigated and non-irrigated cultivation, and for southern Morocco between cultivation in the plain and at high altitudes.—E.B.O.

1058 Taylor, R. L. and others. **Recommended varieties of field crops for Alaska.** *Ext. Circ. 14 Alaska Agric. Exp. Sta.*, 1958, pp. 11.

Edda barley is high yielding and resistant to lodging but susceptible to *Ustilago hordei* and *Helminthosporium gramineum* ; Olli barley is stiff-strawed, resistant to *U. hordei*, and earlier than Edda. Gopher oats have a lower yield than other varieties, but are early maturing. Golden Rain is a high-yielding stiff-strawed oat variety which is reasonably early. Victory is a rather late-maturing white-seeded oat producing long, strong straw ; it should be used as a grain crop only if seed of earlier varieties is unobtainable. None of the recommended oat varieties is resistant to attacks of *Ustilago* sp. Gasser wheat is an early-maturing, lodging- and shattering-resistant, red-seeded variety of excellent feed quality, but its milling quality

is below standard. Khogot wheat is slightly earlier than Gasser but is not of such good quality. —R.B.

1059 LERICHE, R. Les semences de blé, de seigle, d'orge et d'avoine en France métropolitaine. Étude d'ensemble sur l'évolution des contrats de multiplication pour la production des semences de céréales depuis la campagne 1951–1952. [**The seed of wheat, rye, barley and oats in metropolitan France. General study on the evolution of multiplication contracts for the production of cereal seed since 1951–2.**] *Bull. tech. Inform.* 1958, No. 126, 9–20.

Tables show the areas sown in the autumn of 1956, or the spring of 1957, for the production of seeds of different varieties of winter- and spring-wheat, durum wheat, rye, winter- and spring-barley, and spring- and winter-oats.—E.B.O.

1060 SPECHT, G. Bericht über die Ergebnisse der Saatgutbehandlungsversuche zu Getreide der Jahr 1954 und 1955. [**Report on the results of seed-treatment trials with cereals in 1954 and '55.**] *Z. landw. Versuchs- u. Untersuchwes.* 1956, **2**, No. 6, 478–95, bibl. 7, English and Russian summaries. [Potsdam] [Received March, 1958]

Artificial vernalization increased the yield of barley by *c.* 5%, vernalization of wheat was partially successful, and that of oats, unsuccessful. Artificial vernalization did not compensate for the reduction in yield resulting from late sowing and proved less reliable than early sowing and natural vernalization. Artificially vernalized cereal seeds were more sensitive to late frosts and their germination was impaired, compared with the controls ; a shortening of the vegetative period was not observed. The use of pre-soaked or pre-germinated seed was found to be unsatisfactory since in neither case was the yield reduction due to late sowing compensated for, nor was a vegetative advantage observed ; drilling of the treated seeds was difficult. The effect of weather on the results was marked, particularly in the case of pre-soaked seed, since this required a sufficiently moist soil after sowing.—M.P.

1061 FRYER, J. D. **Choosing the best herbicides for cereals.** *Agriculture, Lond.* 1958, **64**, No. 12, 585–92. [Unit Exp. Agron., Oxford Univ.]

In addition to notes on the use of MCPA, 2,4-D, CMPP, sodium monochloroacetate, CP-1815, MCPB and 2,4-DB, a chart is given to aid in the selection of the most appropriate herbicide(s) for any weed or mixture of weeds growing in autumn- or spring-sown cereals whether undersown or not. In the case of spring-sown cereals the recommendations concern early and later growth stages. The chart gives information available up to Jan. 1958.—D.B.

1062 FEYERABEND, G. Spritzbrühmenge, Geräteeignung und Anwendungszeitpunkt bei der chemischen Unkrautbekämpfung. [**Volume of spraying liquid, suitability of implements and time of application in the chemical control of weeds.**] *Dtsch. Landw.* 1957, **8**, No. 12, 611–14, bibl. 12. [Biol. Zentralanst. der Deutschen Akademie der Landwirtschaftswissenschaften, E. Berlin]

A diagram shows which weed in cereal fields can be controlled by (a) hedolit (a caustic substance), (b) growth substances, (c) hedolit + growth substance, and (d) those weeds which are as yet resistant to selective herbicides. Results of large-scale experiments over 2 years are given. Using hedolit, a volume of 400 l./ha. was sufficient if applied at the 3- to 4-leaf stage of the cereal and 600 l./ha. at later stages, the quantity of active substance being 4·2 – 5·6 kg./ha. Using growth substances, the volume of liquid could be limited to 200 or 400 l./ha. when applied between end of tillering and beginning of earing, the quantity of active substance being 1 kg./ha., unless weed infestation was very heavy when 2 kg./ha. became economic. Hedolit should preferably be applied when the weeds are as young as possible, the temperature relatively low and the air not too dry (so that stomata are open). Spraying implements on the German market are discussed.—D.B.

1063 NATIONAL INSTITUTE OF AGRICULTURAL BOTANY, CAMBRIDGE. **Cereal quality.** *Fmrs' Leafl. 14 N.I.A.B.* 1957, pp. 4.

Information is given briefly on the qualities required of : wheat for milling, baking and feeding; oats for milling and feeding ; barley for malting and feeding.—M.P.

1064 LINDER, H. Ein Beitrag zur Echtheitsbestimmung von Getreide und Brassica-Arten. [**Purity determinations of cereal and Brassica varieties.**] *Z. landw. Versuchs- u. Untersuchwes.* 1956, **2**, No. 5, 359–72, bibl. 22, illus., Russian and English summaries. [Inst. f. Landw. Versuchs- u. Untersuchwes., Jena]

Cereal seedlings were grown in a controlled environment in continual light and at 20–24°C. Differences between summer- and winter-cereals could be determined microscopically after 14–21 days' illumination, and macroscopically after 21–28 days. In summer cereals the internodes and vegetative apex were elongated, whereas in winter cereals the vegetative apex remained conical and directly above the root collar. No satisfactory method for differentiating summer- and winter-varieties of Brassica was found, although several vegetative and floral characters were studied.—M.P.

1065 HANF, M. Wuchstoffbedingte Anomalien bei Getreideinflorescenzen. [**Abnormalities in cereal inflorescences caused by**

growth substances.] *Beitr. Biol. Pfl.* 1957, **34**, No. 1, 19–33, bibl. 14, illus. [Landw. Versuchssta., B.A.S.F., Limburgerhof]

The abnormalities in cereal inflorescences resulting from over-dosing or ill-timed spraying with a number of the more commonly-used herbicides are illustrated and discussed, so that the type of abnormality observed can be used to diagnose the cause.—M.P.

1066 OEEC. **Control of pests in stored agricultural products with special reference to grain.** *Project 212 OEEC* 1958, pp. 169, bibl. 43, illus.

This report on a survey in north and south America, Morocco, Algeria, Tunisia, Greece and Turkey, in 1954–5, is a valuable contribution to the knowledge on the prevention and control of insects and mites in stored agricultural products, mainly grain. The main objects of this survey were to ascertain the nature and extent of storage and treatment facilities in exporting countries, and shipment conditions, with a view to the solution of the problems involved. A summary of recommendations is given.—E.B.O.

1067 Bravo, G. Comparación de cuatro insecticidas usados en la desinfestación de bodegas para granos almacenados. [**Comparison between four insecticides used for disinfesting warehouses for stored grain.**] *Agric. trop. Bogotá* 1957, **13**, No. 10, 601–5, bibl. 7.

Of the insecticides tested, 0·5% malathion was the most effective and its use is recommended. It was applied as a spray at the rate of 8 l. per 90 sq.m.—E.B.O.

1068 Hukill, W. V. **Grain moisture indicator.** *Agric. Engng, St. Joseph, Mich.* 1957, **38**, No. 11, 808. [Iowa Agric. Exp. Sta., Ames]

A moisture indicator accurate to within 2% was constructed from 2·5 in. of pipe cleaner (the sensing element) with a copper lead soldered to each of the 2 wires. A length of constantan wire was soldered to one of the copper leads. This, and the 2 copper wires extend to a reading instrument. Measurements of resistance and temperature could be used to calculate moisture content in the grain. —R.B.

1069 Ministry of Agriculture, Fisheries and Food. England and Wales. **In-sack grain drying.** *Fm Mach. Leafl. 12 (Revised) Minist. Agric. Fish., Fd, England and Wales* 1957, pp. 8, illus.

1070 Nederlands Graan-Centrum, Wageningen. Tien-jarenplan voor graanonderzoek. Verslag over het 3de jaar, 1956. [**Netherlands Grain Centre. Ten-year plan for cereal research. Report on the third year, 1956.**] pp. 132, illus.

(1) Hybridization programme and study of resistance to climatic conditions. By G. Dantuma, pp. 10-15. Hybridized populations of wheat, barley and oats, 402 in number, were produced for genetic study. In the study of resistance to climatic conditions, the effect of stage of development on cold-resistance and winterhardiness was examined, and special attention was paid to the factor day-length under different degrees of vernalization.
(2) Research on seed dormancy and sprouting. By B. Belderok, pp. 42–53, bibl. 11. In the period 3 weeks before harvest to about 12 weeks after harvest, regular germination tests and biochemical studies were made of grain of 3 red wheat varieties, Carsten's VI (inclined to sprout) and Mado and Peko (not inclined to sprout) ; and the subject of different degrees of retarded germination (a term preferred to " dormancy " in speaking of wheat) was studied with special reference to water supply.
(3) Study of the rye constituent injurious to young pigs. By J. Dammers, pp. 54–9, bibl. 5.
(4) Multiplication of inbred strains of rye in connexion with the improvement of this cereal for animal feed. By F. P. Ferwerda, pp. 68–9.
(5) Experiments relating to fundamental grain-crop research. By W. H. van Dobben, pp. 78–97. Subjects covered are stiffness of straw ; the influence of soil pH on development of the grain ; the influence of heat on yield and quality ; the influence of excessive rainfall on yield and quality ; the influence of daylength.
(6) The drying and storage of grain on the farm in 1956. By J. Kreyger, pp. 102–9.—G.M.R.

LEGUMES

SOYABEANS

1071 Mitrović, A. Uticaj vremena setve na razvitak i prinos soje na području Južnog Banata. [**The effect of sowing time on development and yield of soyabeans in the Southern Banat region.**] *Arhiv polj. nauke* 1957, **10**, No. 30, 96–104, bibl. 3, French summary. [Yugoslavia]

As a result of 4 years' observations it is concluded that yields of *Glycine soja* in this region are best when the seed is sown between 10 and 20 April, absolute seed weight varying between 143 and 153 g. per 1000 seed. F. French s.—M.H.

1072 Grabe, D. F. **Identification of soybean varieties by laboratory techniques.** *Proc. Ass. off. Seed Anal. N. Amer.* 1957, **47**, 105–19, bibl. 22, illus. [Mississippi State Coll., State College]

A key for identifying American varieties of soyabeans is given. The study of a combination of qualitative seed and seedling characters was the most promising approach to the varietal determination of soyabeans in the laboratory. The morphological characters employed in constructing the key

were colour of seed-coat, hilum and hypocotyl, and type of pubescence. Only the variety Minsoy possessed roots which did not fluoresce under ultra-violet illumination. The fungus *Peronospora manshurica* was used for measuring fungal resistance, a character invaluable in differentiating morphologically similar varieties. A modification of the above procedure may be used for varietal determination in other self-pollinated crops. F.s.—R.B.

1073 Indyk, H. W. **Pre-emergence weed control in soybeans.** *Weeds* 1957, **5**, No. 4, 362–70, bibl. 13. [Delaware Agric. Exp. Sta., Newark]

The results are given of trials on light soils in Delaware during 1954–6, in which a wide range of herbicides was tested as pre-emergence treatments for weed control in soyabeans. All herbicides were applied in 30 gal. spray vol./ac. The principal weeds present were : *Amaranthus retroflexus*, *Chenopodium album*, *Ambrosia artemisiifolia*, *Ipomoea* spp. and *Digitaria* spp. Combinations of NaPCP at 20 lb./ac. + CDEC at 10 lb./ac., or NaPCP at 25 lb./ac. + 2,4-D isopropyl ester at 2 lb./ac., gave excellent control of broad-leaved species and good control of *Digitaria* spp. CDEC or CDAA at 8 lb./ac. were effective for controlling *Digitaria* spp. NaPCP at 25 lb./ac. gave excellent control of broad-leaved species and some control of grasses ; also, its use resulted in increased soyabean yields in a number of cases. A number of other materials were effective for controlling weeds, but reduced soyabean yields. [See also *Fld Crop Abstr.* 10 : 1395.] —P.J.B.

1074 Staniforth, D. W. **Soybean-foxtail [*Setaria lutescens*] competition under varying soil moisture conditions.** *Agron. J.* 1958, **50**, No. 1, 13–15, bibl. 5. [Iowa Agric. Exp. Sta., Ames]

[See also *Fld Crop Abstr.* 10 : 563.]

1075 Slife, F. W. [Summarizer] [**Weed control in**] **Soybeans.** [4 abstracts] *Res. Rep. 14th N. Cent. Weed Contr. Conf.* [*USA*] 1957, 96–8.

In trials in Ohio, the following pre-emergence treatments, applied in 40 gal. spray/ac., resulted in 90% reduction of stands of *Setaria* sp. and *Amaranthus retroflexus* : CDAA at 3 lb./ac., NPA at 4 lb./ac., CIPC at 8 lb./ac., EPTC at 4 lb./ac., and 3,4-dimethylbenzylphenone at 12 lb./ac. When applied to soyabeans at the cotyledonary stage of growth, only dinoseb at 3 lb./ac. and MCPB at 2 lb./ac. gave good control of weeds, with no crop injury. In trials in Illinois, dinoseb amine salt at rates of 1, 2, 3 and 4 qt./ac. was applied to soyabeans at the following growth stages : cotyledons emerging, cotyledons unfolded, first 2 true leaves unfolded and first trifoliate leaf unfolded. No crop injury was caused by treatments at the first growth stage and all rates of dinoseb gave excellent control of broad-leaved and grass weeds. Rates of 2, 3 and 4 qt./ac. applied at the 2nd growth stage gave good weed control with no crop injury. Treatment at later growth stages injured the crop.—P.J.B.

1076 Ci, Č. [**Preliminary note on the effect of microelements on yield and quality of soyabean seed.**] [Chinese] *Acta bot. sin.* 1956, **5**, No. 4, 439–44, bibl. 24, Russian summary. [Forest/Soil Inst., Acad. Sci., China]

The microelements studied in cultures were boron, manganese, molybdenum, zinc, and copper. In uniform concentrations, zinc and molybdenum gave the best results in increasing yields (21 and 20% over the controls, respectively). The germinating capacity of the seed was enhanced by treatment with each of the microelements. F. Russian s. —M.H.

1077 Pohjakallio, O. and Antila, S. Eräiden soijalajikkeiden fotobiologisista ominaisuuksista. [**Photoperiodic characters of some bred strains of soyabeans.**] *Maataloust. Aikakausk.* 1957, **29**, No. 3, 113–20, bibl. 3, illus., German summary and table headings. [Phytopath. Inst., Univ. Helsinki]

Two Swedish (Fiskeby 843–15–4 and Fiskeby 846–2–1) and one Korean variety of soyabean (Pando) were studied for their response to different photoperiodic treatments. All proved to be approximately neutral in relation to daylength. With low light-intensity there was a considerable amount of etiolation, especially in the Fiskeby varieties, but the time at which flowering occurred was only slightly affected by changes in light intensity. Even with very little light (25% of the light outdoors), ripe seeds developed. The amount of seed grown was least affected by alteration in light intensity in the variety Fiskeby 846–2–1 and most affected in Pando. In the field trials, however, Fiskeby 846–2–1 gave the lowest seed yield of the 3 varieties. On the basis of the experiments, and of others conducted at the Wiik Experiment Farm, Helsinki (Tables 6–7) it is concluded that in the south of Finland, light conditions have hardly any effect upon success in growing the almost-neutral bred strains concerned. Results confirm Rudorf's finding [see Holmberg, *Fld Crop Abstr.* 9 : 811] that the northern limit for growing the Fiskeby soyabean varieties is governed by low temperature. F.s.—G.M.R.

1078 Sironval, C. and others. **Action of day-length on nodule formation and chlorophyll content in soyabean.** *Physiol. Plant.* 1957, **10**, No. 4, 697–707, bibl. 10. [Univ. Liège, Belgium]

Seeds of the long-day soyabean variety Capitole were inoculated with Rhizobia and sown in soil with a very low N content. On

emergence the plants were placed in a phytotron and grown under 8- or 16-hr. photoperiods. After 4 months' growth, the plants grown under 8- and 16-hr. photoperiods had an average of 9 and 30 nodules, respectively. In further trials in which the short-day variety Illini was included, after growing for 77 days under 8-hr. photoperiods, Illini and Capitole had an average of 6·1 and 3·9 nodules and under 16-hr. photoperiods, 23 and 13·6, respectively. It was concluded that the effect of long day-length in increasing nodulation was separate from the photoperiodic reaction of the varieties used. In studies on the effect of day-length on chlorophyll content, nodule activity tended to modify the chlorophyll content of the leaves, especially in plants grown under 16-hr. photoperiods ; in young leaves the chlorophyll content increased, but in older leaves, it decreased. —P.J.B.

1079 Worsham, A. D. and Giddens, J. **Some effects of 2,2-dichloropropionic acid on soil microorganisms.** *Weeds* 1957, **5,** No. 4, 316–20, bibl. 7, illus. [Univ. Georgia, Athens]

Dalapon was added to soil in 2 gal. containers at rates of 17, 34 and 68 lb./ac. Inoculated soya-bean seed was sown 1, 7 and 21 days after the dalapon treatments and the surviving plants removed from the containers at 50 days from sowing, for assessments of nodulation. The dalapon had no adverse effects on the total soil population of bacteria, actinomycetes and fungi. Soyabeans sown 1 day and 7 days after dalapon treatment showed symptoms of toxicity at all herbicidal rates used, while plants grown from seed sown 21 days after treatment showed no toxicity. The treatments had no observable effect on nodulation. —P.J.B.

1080 Lona, F. and others. Portamento rampicante-volubile provocato, in alcune piante, dal trattamento con acido gibberellico. [**Climbing-twining habit caused by treatment with gibberellic acid in some plants.**] *Nuovo G. bot. ital.* 1956, **63,** No. 4, 496–506, illus., English summary. [Ist. Bot., Univ. Parma, Italy]

Treatment of young soyabean plants with gibberellic acid (1 cu. cm. of an aqueous solution $5 \cdot 10^{-5}$ [g./l.] sprayed on the apex every 24 hr. for 12 days) caused the stems to elongate and adopt a climbing-twining habit.—E.B.O.

GROUNDNUTS

See also Abs. 1322, 1327, 1328, 1336, 1337, 1338

1081 Bryssine, P. L'arachide et les essais de sa culture au Maroc. [**Groundnut trials in Morocco.**] *Terre maroc.* 1958, **32,** No. 338, 1–6 and No. 339, 37–41, bibl. 29. [Centre Rech. Agron., Rabat, Morocco]

An account is given of groundnut trials to study varieties, sowing date, spacing, bacterial inoculation, and irrigation. It is concluded that it is possible to grow satisfactory crops of groundnuts in Morocco. The main disadvantage is the high expense this crop entails.—E.B.O.

1082 Krapovickas, A. and Rigoni, V. A. Nuevas especies de *Arachis* vinculadas al problema del origen del maní. [**New species of *Arachis* related to the problem of the origin of groundnuts.**] *Darwiniana, B. Aires* 1957, **11,** No. 3, 431–55, bibl. 31, illus. [Esta. Exp. Manfredi, Córdoba, Argentina]

Information, including a description, is given on *Arachis monticola* nov. sp., an annual wild species related to *A. hypogaea*, present in the mountains of Argentina, in localities where groundnuts are not grown. *A. pusilla*, *A. helodes* nov. sp. and *A. lutescens* nov. sp. are also described.—E.B.O.

1083 Nagarajan, S. S. and Gopalakrishnan, S. **Root inducing substance in groundnut seeds.** *Curr. Sci.* 1958, **27,** No. 1, 29–30, bibl. 5, illus.

Seeds of the dormant, spreading-type variety of *Arachis hypogaea*, TMV.3, which had been previously soaked in an aqueous extract of the seed of the non-dormant, bunch-type variety, TMV.2, germinated and produced adventitious roots from cotyledon- and stem-bases. The seed extract of TMV.2 contains a root-inducing substance which has properties of synthetic auxin.—D.B.

1084 Reid, P. H. and York, E. T. Jr. **Effect of nutrient deficiencies on growth and fruiting characteristics of peanuts in sand cultures.** *Agron. J.* 1958, **50,** No. 2, 63–7, bibl. 14, illus. [N. Carolina Agric. Exp. Sta., Raleigh]

Symptoms of nutrient deficiency were observed wherever an essential nutrient was omitted, except in the case of Cu, Mo and Cl where the only symptom was a reduction in growth. Dry weights of the aerial portions of the plants were significantly reduced by deficiencies of every element studied. Flower production was reduced by all deficiencies except Mn and Mo. Peg formation was reduced by N-, Ca- and S-deficiency, and prevented by B-deficiency. Of the plants receiving deficient culture solutions from the time of sowing, only those deprived of Mo and Cu gave mature fruit. Depriving plants of P, Mn, Mo and Cu at the early-flowering stage failed to reduce pod formation. B-deficiency symptoms developed in 1951 ; in 1952 the plants were covered with polyvinyl plastic covers and symptoms of B-deficiency failed to develop. N-, Ca-, Mg-, B- and S-deficiencies appeared rapidly after the respective elements had been withheld from the culture solution. P, K, Mn, Fe, Cu, Zn and Mo supplied early in the season were sufficient for the life cycle to be completed, though growth and fruit formation were reduced. F.S.—R.B.

1085 Alegre, G. Contribution à l'étude du photopériodisme de l'arachide en relation avec la température. [**A contribution to the study of photoperiodism in groundnuts in relation to temperature.**] *Agron. trop., Nogent* 1957, **12,** No. 4, 494–507, illus., English and Spanish summaries.

Plants of the groundnut variety 28–204 from Senegal were grown in the Paris region, some with a normal day-length of about 15 hr. and others with a day-length reduced to 9 hr. Each lot was subjected to 3 temperatures : (a) optimal temperature (similar to that at Tambacounda, Senegal) for 24 hr. in the greenhouse ; (b) temperature as in (a) during the nights only ; (c) open-air temperature for 24 hr. Results from this trial showed that: under (a) flowering in the plants grown with a photoperiod of 9 hr. was 50% less than in those at 15 hr. ; under (b) the rate of flowering was practically the same for the 2 day-lengths ; under (c) with low-temperature conditions, reducing the day-length to 9 hr. more than trebled the rate of flowering. It is concluded that temperature is the most important factor for the growth and development of groundnuts.—E.B.O.

1086 Huber, A. **The influence of depth of sowing and light conditions on the development of the peanut seedling.** *Bull. Res. Coun. Israel, D. Bot.* 1957, **5D,** No. 4, 257–62, bibl. 5, illus. [Hebrew Univ., Rehovot]

The response of groundnut seedlings to variation in depth of sowing and light conditions was studied by size measurements. Seedlings were grown under various conditions of depth of sowing and of light, and measurements were made of their hypocotyls, epicotyls, total length of shoots, and roots. It was found that : (1) The innate potentiality for hypocotyl lengthening in groundnuts varies greatly. The maximum length obtained was 15 cm. but usually the hypocotyl length does not exceed 12 cm. (2) Whenever the hypocotyl is unable to outgrow the depth of sowing, emergence is completed through further growth of the epicotyl and the rest of the shoot. (3) Both the length of the hypocotyl and that of the underground section of the epicotyl tend to increase with the depth of sowing. The ratio between the two is irregular. (4) The effect of light markedly decreases the lengthening of the hypocotyl. (5) The cotyledons turn green when exposed to sunlight, but never develop into leaf-like form. (6) The length of roots tends to decrease with increased depth of sowing. F.S.—M.H.

1087 Venkatrao, S. and Pantulu, A. J. **The chemical composition and nutritive value of groundnut (peanut) and its products.** *Indian Oilseeds J.* 1957, **1,** No. 5, 322–9, bibl. 70.

This literature review gives data on the protein-, oil-, carbohydrate-, vitamin- and mineral-content of *Arachis hypogaea.*—D.B.

1088 Singh, R. P. and Manku, J. S. **Groundnut decorticator for efficiency, economy.** *Indian Fmg* 1957, **7,** No. 9, 17–19, illus. [Indian Agric. Res. Inst., New Delhi]

The construction and working of a Japanese, hand-operated groundnut decorticator is described. Its efficiency under Indian conditions was tested at the above Institute. Its output was 526 lb. groundnuts per 8-hr. day. Undecorticated kernels were 4·9% of the total output and broken kernels were 28·5% of whole kernels. It is recommended for use.—D.B.

1089 Duerden, J. C. and Cutler, J. R. **The storage of groundnuts under tropical conditions. 1. The effects of prolonged storage on undecorticated and decorticated groundnuts.** *J. Sci. Fd Agric.* 1957, **8,** No. 10, 600–4, bibl. 4. [W. Afr. Stored Prod. Res. Unit, Kano, Nigeria]

The groundnuts were harvested at the end of 1953. Before stacking in May '54 all nuts were fumigated with methyl bromide [rate not stated] and sieved to remove dust. Sampling was carried out 10, 13 and 16 months after stacking. At the last sampling date little difference was found between undecorticated, hand-shelled and 'pestle-and-mortar'-shelled nuts, in the loss of weight and production of powder resulting from insect attacks (mainly *Tribolium castaneum*), but there were large differences in the build-up of free fatty acids. The insects did cause breakage of the nuts, but attacked, in particular, broken pieces of nuts and those with damaged shells. Under the conditions of the experiment an unbroken shell provided complete protection of the kernels. F.S.—M.P.

PEAS

See also Abs. 1211, 1212, 1215

1090 Statens Forsøgsvirksomhed i Plantekultur, Denmark. Forsøg med sorter af foderærter og kogeærter 1951–56. [**Trials with varieties of fodder peas and culinary peas, 1951–6.**] *Medd. 576 Stat. Forsøgsvirk. Plantekult,* 1957, pp. 4.

The trials reported were carried out at 5 locations in Denmark. In 27 trials with fodder peas during 1951–6, seed yields of Svalöf Brio and Glænø Trifolium averaged 22·1 and 18·8 hkg./ha. (15% moisture). During 1953–6 in 17 trials, the mean seed yield of Øtofte Felix (166/46) was 22·9 hkg./ha. and that of Trifolium 53/1–5 in 12 trials during 1954–6 was 19 hkg./ha. In 27 trials during 1951–6 with culinary peas, the average seed yields of Øtofte Sixtus (90/46), Øtofte Flavo and Kron 101 were 23·1, 20·6 and 20·2 (15% moisture), respectively. The average seed yield of Weibulls Strål during 1954–6 in 12 trials was 21·7 hkg./ha. Brief notes are given on each variety.—P.J.B.

1091 Statens Forsøgsvirksomhed i Plantekultur, Denmark. Forsøg med ukrudts-

bekæmpelse på forskellige tidspunkter i ærter. [**Trials on weed control in peas at different growth stages.**] *Medd. 570 Stat. Forsøgsvirk. Plantekult.* 1957, pp. 2.

In trials during 1955–6 at 5 locations, peas grown for harvest at maturity were treated as follows : (a) 4 l. 20% dinoseb /ha. pre-emergence, (b) 4 l. dinoseb when the peas were 2–5 cm. high, (c) 4 l. dinoseb at 10–15 cm. high, and (d) 3 l. 20% dinoseb + 1 l. 25% MCPA/ha. when the peas were 10–15 cm. high. The herbicides were applied in 500 l. spray. Mean seed yields following treatments (a), (b), (c) and (d) were 22·7, 22·9, 22·3 and 22·5 hkg./ha., respectively, compared with 21·7 hkg. for untreated controls. Best weed control was secured by treatment (b) which reduced weed stands to 24% of those on the control plots. In similar trials with peas grown for picking green, pod yields following treatments (a), (b), (c) and (d) averaged 116·5, 117·9, 114·9 and 120·4 kg. per 100 $m.^2$, respectively, compared with 111·5 kg. for controls. It was concluded that peas should be sprayed when 2–5 cm. high, as the weeds present were then at their most susceptible stage. Data are given for adjusting the rate of dinoseb treatment according to prevailing temperatures. —P.J.B.

1092 Krüger, H. Untersuchungen über Anwendung und Wirkung verschiedener Herbicide (2,4-D, MCP, DNC, DNBP, IPC und Kalkstickstoff) zur Unkrautbekämpfung in Erbsen und Lein. [**The use and effect of several herbicides (2,4-D, MCPA, DNC, DNBP, IPC, and calcium cyanamide) for controlling weeds in *Pisum* and in *Linum usitatissimum.***] *Kühn-Arch.* 1957, **71**, No. 3, 384–450, bibl. 65, illus., English, French, Russian and German summaries. [Inst. Acker- u. PflBau, Martin-Luther-Univ., Halle-Wittenberg, E. Germany]

All pre-emergence treatments of peas resulted in yields lower than from the control plot (hoed once by hand). In post-emergence treatment, 2,4-D and MCPA resulted in delayed flowering and reduced yields. The best seed yield was obtained with 5 l. DNBP/ha. applied when the weeds were young (up to 4-leaf stage) and the pea plants 6–10 cm. tall. Pea plants which had attained a height of 5 cm. were not injured by calcium cyanamide at 200 kg./ha., but calcium cyanamide could not be recommended in practice. [For results with *Linum usitatissum* see *Fld Crop Abstr.* 10 : 1540.]—D.B.

1093 Sexsmith, J. J. [Summarizer] [**Weed control in] Field and canning peas.** [8 abstracts] *Res. Rep. N. Cent. Weed Contr. Conf.* [*USA*] 1957, 118–24.

In trials in Alberta, of a number of herbicides applied before peas were sown, EPTC at 4 lb./ac., CIPC at 6 lb. and 1,2,4,5-TCB at 15 lb./ac. resulted in over 80% control of wild oats ; with *Setaria viridis*, only EPTC at 4 lb./ac. gave over 80% control, with little injury to the peas. In trials in Wisconsin, the following pre-emergence treatments showed most promise : dalapon at 2 lb./ac., TCA at 6 lb./ac., CDAA at 4 lb./ac., EPTC at 4 lb./ac. and dinoseb at 8 lb./ac. In trials in Minnesota, pre-emergence treatment with monuron and a triazine compound related to simazin at 2 lb./ac. and another triazine herbicide at 4 lb./ac. gave prolonged control of broad-leaved weeds and *Setaria* spp. Ext.—P.J.B.

1094 Haupt, W. Photoperiodische Reaktion bei einer als tagneutral geltenden Sorte von *Pisum sativum.* [**Photoperiodic response in an apparently day-neutral variety of *Pisum sativum.***] *Ber. dtsch. bot. Ges.* 1957, **70**, No. 5, 191–8, bibl. 12.

The day-neutral pea variety Kleine Rheinländerin reacted as a quantitative long-day plant (i.e. a late-flowering variety) when the cotyledons were cut off, and when growth and flowering conditions were unfavourable and restricted. Total darkness delayed flowering less than did a short day (9 hr.), but flowering occurred at the same nodes as in a long-day plant. Shortening the length of day was equivalent in its effect to reducing the light intensity.—M.P.

1095 Misra, V. K. and Sen, A. **Effect of low and high nitrogen materials on nodulation of pea in Delhi soil.** *J. Indian Soc. Soil Sci.* 1957, **5**, No. 4, 247–51, bibl. 10. [Indian Agric. Res. Inst., New Delhi]

Nodules on pea plants treated with mahua cake (low in N) were small, white, and distributed over the lateral roots. With other treatments (ammonium nitrate, urea, and mixtures of these with mahua) nodules were pale brown, larger, had 2 or 4 lobes and were distributed over the tap root and lateral roots. The N- and P_2O_5-content of the nodules was lowest under mahua treatment and this may be attributed to the presence of saponin in mahua. All treatments produced approximately the same number of nodules but these were lighter in weight on mahua-treated plants than on others. The yields of vines + peas and peas alone were significantly related to the weight of the nodules at 10-weeks' growth.—D.B.

PIGEON PEAS

1096 Agnihothrudu, V. **The density of the rhizosphere microflora of pigeon-pea (*Cajanus cajan* (L.) Millsp.) in relation to the wilt caused by *Fusarium udum* [*F. merismoides*] Butler.** *Naturwissenschaften* 1957, **44**, No. 18, 497, bibl. 5. [Univ. Bot. Lab., Madras 5, India]

The rhizosphere population of pigeon pea increased in number in the presence of *F. meris-*

moides, the number of fungi decreasing, but the number of bacteria increasing greatly. The rhizosphere of wilted and dying plants, however, contained a greater number of fungi than bacteria. In soil infested with *F. merismoides*, the micro-floral population in the rhizosphere of wilt-susceptible pigeon pea strains was larger than that of wilt-resistant plants. Again, the rhizosphere population of plants growing at moisture levels lower than 30% of the total moisture capacity of the soil was higher than of those growing at moisture levels above 30% of the total capacity. At the higher levels no significant differences were observed between rhizosphere population numbers of wilt-resistant and wilt-susceptible plants. This is thought to be due to errors introduced in the sampling of soil with high moisture contents.—M.P.

VETCH

See also Abs. 1355

1097† Kozak, M. P. **[Accelerating the ripening of spring vetch seed.]** [Russian] *Zemledelie* (*Agriculture, USSR*) 1958, **6**, No. 2, 73–5, illus. [Krosnoufimsk Select. Sta.]

In the Sverdlovsk Province green harvests of spring vetch [*Vicia sativa* var.] amount to 20,000–30,000 kg./ha. and seed yields to 2,000 kg./ha., but because of late ripening much of the seed is lost. By early sowing the quantity of ripe seed is increased, except in years when there is abundant rainfall during July/August ; this applies specially to the Ural area and northern parts of the Sverdlovsk and Perm Provinces. At the above Station a method of subjecting the seed to low temperature has been developed to hasten ripening. This method consists of treating the seed 60 days before sowing (in the Sverdlovsk and Perm Provinces during the first few days in March). The seed chosen for treatment should be of good quality and cleaned. It is kept during the night in a warm place (14–18°C.) and the following day soaked to 60–84% moisture content (100 kg. seed with 15% moisture content placed in 70 l. water and stirred every 30 min. during imbibition). The day after soaking, the seed is transferred to containers (155 × 75 × 12 cm.) and kept in a layer 6–8 cm. thick. After about 1 hour the containers are put in the open and the seed stirred for 10–15 min. to cool. Subsequently the containers are placed, one above another, (with interlayers of sticks to facilitate aeration) in a vernalizing cabinet. The cabinet is kept in an open hut, or between trees, at a temperature of 0–8°C., depending on the weather, and the seed remains in the cabinet until sown (at the normal, early date and rate for the region). It is claimed that crops from treated seed have a shortened vegetative period (e.g. from 4 to 16 days [shorter] in the Sverdlovsk/Perm area) and that the seed ripens earlier than that of the controls (e.g. from 15 to 25 days earlier on the Krasnoufimsk plots).—M.H.

LUPINS

1098† Kawamata, M. and Tsukijima, Y. **Studies on flowering, fruiting and germination of lupin plants. 4. Effect of drier 'Desiccan' sprayed at ripening stage on time of maturity and germination of seed.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1957, **26**, No. 2, 137, English summary. [Kanoya Branch, Kagoshima Prefectural Agric. Exp. Sta.]

To avoid rain injury, 1% and 5% solutions of desiccan were sprayed, at the rate of 500 ml./3·3 m.², on the 40th, 50th and 60th days after beginning of flowering. Graphs show that the 1% solution sprayed 50 days after flowering (i.e. 15 days before "natural" maturity) was the most suitable practice. F. Eng. s.—D.B.

1099† Van Steveninck, R. F. M. **The effect of growth substances on pod-setting in lupins.** *N.Z. J. Sci. Tech. A*, 1957, **38**, No. 10, 1011–14, bibl. 12. [Dep. Sci. Ind. Res., Christchurch, N.Z.]

An attempt was made to prevent shedding of flowers and pods by using growth-substance sprays in order to increase the seed yield in yellow lupins (*Lupinus luteus*). None of the six growth substances, which were applied at three different concentrations, caused a significant change in seed yield. *p*-chlorophenoxyacetic acid and γ-phenylbutyric acid had a slightly depressing effect on yield ; 2,3,5-tri-iodobensoic acid at 1000 ppm. caused a significant increase in seed size. F.s.—M.H.

1100† Rønnike, F. **Effect of the cotyledon temperature on growth of *Lupinus albus* roots.** *Physiol. Plant.* 1957, **10**, No. 5, 937–42, bibl. 5. [Pl. Physiol. Lab., Roy. Vet. and Agric. Coll., Copenhagen, Denmark]

Where roots and cotyledons were held at the same temperatures, the optimum rate of root elongation occurred at 22–23°C. In further trials, the temperature of the roots was held constant at 15°C., but that of the cotyledons held at specific points in the range −5° to +50°C. Maintaining the cotyledons at temperatures at any point in the range 5–35°C. had only negligible effects on the rate of root elongation. Thus, it was concluded that temperatures around the root had a decisive effect on the rate of root elongation and that the supply of nutrients from the cotyledons remained at an optimum level, even though their temperature was much lower than that of the root zone. —P.J.B.

BAMBARRA GROUNDNUTS

1101 Dufournet, R. Note sur le voanjobory (*Voandzeia subterranea* Dup. Thouars)

cultivé à Madagascar. [**Note on Bambarra groundnut (*V. subterranea*) grown in Madagascar.**] *Riz et Rizicult.* 1957, **3,** No. 4, 169–72, bibl. 11, English and Spanish summaries.

Observations, concerning mainly productivity and chemical composition of the seed, are reported on 7 types of Bambarra groundnut, grown at the Agronomic Station of Lake Alaotra. At Vohimena, yields of 1300–1500 kg. of nuts per ha. were obtained.—E.B.O.

FIELD BEANS

1102 Stålfelt, M. G. **The water output of the guard cells of the stomata.** *Physiol. Plant.* 1957, **10,** No. 4, 752–73, bibl. 44. [Pl. Physiol. Dep., Univ. Stockholm, Sweden]

The studies reported were made on leaves of *Vicia faba* to investigate non-osmotic processes operative in the guard cells of stomata.—P.J.B.

JACK BEANS

1103† Addison, K. B. **The effect of fertilizing, espacement and date of planting on the yield of jack bean** (*Canavalia ensiformis*). *Rhod. agric. J.* 1957, **54,** No. 6, 521–32, bibl. 9. [Henderson Res. Sta., S. Rhodesia]

In the trials, N at 20 and 40 lb./ac., applied before sowing, reduced the yields of air-dried seed of *C. ensiformis*, as did 60 lb. K_2O/ac. ; 19 lb. P_2O_5/ac. was slightly beneficial and 1000 lb. agricultural lime/ac. increased yields significantly. There was a positive P × N interaction, but at no time did it counteract the depression in yield caused by N. Where 250 lb. of a 2 : 2 : 1 NPK mixture per ac. were applied, yields were increased. An inter-row spacing of 1 ft. resulted in lower yields than where spacings of 2 ft. or 3 ft. were used (with 9-in. spacing within the rows). Date-of-sowing trials stressed the value of sowing early. Plots sown on 1 Nov., 1 Dec. or 1 Jan. yielded 2004, 1631 and 64 lb./ac., respectively. Jack bean has been found to be a valuable and cheap source of protein for beef stock. [See *Herb. Abstr.* 27 : 615.] —M.P.

CYAMOPSIS PSORALOIDES

1104 Rewari, R. B. and others. **Excretion of nitrogen from the roots of guar bean *Cyamopsis psoraloides*.** *J. Indian Soc. Soil Sci.* 1957, **5,** No. 4, 237–45, bibl. 9, illus. [Indian Agric. Res. Inst., New Delhi]

Excretion of N from the roots of guar and N fixation by the legume both increased as a result of treatment of the soil with superphosphate. The amount of excretion varied from 8 to 21% of the total N fixed by the legume. F.s.—D.B.

GENERAL

1105 Nilsson, P. E. **Preparation of legume inoculants, with special reference to the pre-inoculation of legume seeds.** *K. LantbrHögsk. Ann.* 1957, **23,** 255–72, bibl. 44. [Inst. Microbiology]

The general conditions for symbiotic nitrogen fixation are briefly discussed. An account is given of the more important phases in the work of producing bacterial preparations for the inoculation of legumes. Experiments in the cultivation of *Rhizobium leguminosarum* and production of bacterial preparations for the pre-inoculation of pea seed are described. The test of the preparations in pea cultures indicates possibilities of pre-inoculation at such an early stage that inoculation in bulk before distribution of the seed to farmers appears feasible. F.s.—G.M.R.

1106† Bonnier, C. Symbiose *Rhizobium*–légumineuses en région équatoriale. [**Legume-*Rhizobium* symbiosis in equatorial regions.**] *Ser. sci. 72 INÉAC* 1957, pp. 67, bibl. 40, illus. [Inst. Agron. État, Gembloux, Belgium]

An account is given of trials and observations made during a mission to the Belgian Congo, in 1956, to study the local *Rhizobium* strains and their adaptation to the principal legumes grown. Among these were : *Arachis hypogaea*, *Glycine soya* and *Phaseolus* sp. The general conclusion was that studies on the symbiotic fixation of atmospheric N by legumes have great possibilities in Africa, in particular the Belgian Congo where they could influence the evolution of agriculture considerably. The inoculation of legume seeds with suitable *Rhizobium* strains could help in solving the problem of soil fertility.—E.B.O.

ROOT CROPS

SUGAR-BEET

See also Abs. 1234, 1326, 1332, 1339

1107 British Sugar Corporation. **Sugar beet cultivation for maximum yields per acre.** *Brit. Sugar Corp. Bull. 11* [n.d.], pp. 16, illus. [Received Feb., 1958]

Information is given on the sowing, cultivation, fertilizing, thinning, and harvesting of sugar-beet in Britain.—M.P.

1108 Ragazzi, G. La nostra produzione commerciale di semi di bietole zuccherine. [**Our commercial production of sugar-beet seed.**] *Sementi elette* 1957, **3,** No. 5, 44–52, bibl.3, illus., English and German summaries.

Italy produces its own sugar-beet seed, the principal sugar-beet types being : P (late ; high root-weight ; medium sugar-percentage ; suitable for low-fertility soils), Z (early ; low root-weight ;

high sugar-percentage ; suitable for very fertile soils), and N (characters intermediate between P and Z). There is also a type R, resistant to *Cercospora beticola*. Sugar-beet for seed is grown in Italy in regions having long, cold winters (Romagna, Po Delta) in irrigated, fertile soils. The seed is sown in nurseries in the middle of August in rows 20–25 cm. apart at the rate of 20–25 kg./ha. The stecklings are lifted at the beginning of March and those which reach 2-cm. diameter at the collet are transplanted in rows in the field before 15 March at a density of 12,000–20,000 plants/ha. (20,000 plants/ha. is best). The seed is harvested during 15 July – early August, yields of 2500 kg./ha. being satisfactory (yield range 1000–4000 kg./ha.).—E.B.O.

1109 Rapin, J. Le contrôle cultural des variétés de betteraves à sucre livrées par la Sucrerie et Raffinerie d'Aarberg. [**The cultivation control of sugar-beet varieties issued by the sugar refineries of Aarberg.**] *Rev. rom. Agric.* 1957, **13,** No. 12, 103–6. [Stat. féd. d'Essais agric., Lausanne, Switzerland]

Tabulated data show the performance, during 3 years, of sugar-beet varieties belonging to the E (high-yielding), N (normal) and P (polyploid) series as regards root yield, sugar content, sugar yield, yield of leaves and crowns, resistance to *Cercospora* ; and observations on bolting. Varieties of the N series are suited to medium altitudes because they give adequate yields when sown later and harvested earlier than those of the E series. Varieties of the P series require a long growing period but give high sugar-yields, and the tops supply abundant forage. They combine the high beet-yields of series E with the high sugar-content of series N. Their cultivation is increasing in Switzerland.—D.B.

1110 Grimaldi, A. and Bonciarelli, F. La determinazione della germinabilità nei glomeruli di barbabietola. [**The determination of germinating capacity in sugar-beet glomerules.**] *Sementi elette* 1957, **3,** No. 5, 11–23, bibl. 14, illus., English and German summaries. [Ist. Agron., Univ. Perugia, Italy]

The results from laboratory trials to test the germinating capacity of sugar-beet glomerules indicated that mixing them with coal dust, or using sand as a substratum, reduced the amount of root browning and stimulated the germinating energy, and that similar, and possibly better, results were obtained by washing the glomerules, or soaking them in water and then washing them, before germination.—E.B.O.

1111 Den Ouden, H. Het bietencystenaaltje en zijn bestrijding. 4. Enige proeven over de verwelking van bietenbladeren onder invloed van door bientencystenaaltjes-larven afgescheiden stoffen. **Sugar-beet eelworm and its control. 4. Experiments on wilting of sugar-beet leaves caused by secretions of larvae of *Heterodera schachtii*.** *Meded. Inst. rat. Suikerprod.* 1957, **26,** (1956), No. 3, 109–29, bibl. 3, illus., English summary.

1112 Beysel, D. Osmotischer Wert und Viscosität des Protoplasmas diploider und polyploider Zuckerrüben. [**The osmotic value and viscosity of the protoplasm of diploid and polyploid sugar-beets.**] *Ber. dtsch. bot. Ges.* 1957, **70,** No. 3, 109–20, bibl. 15. [Bot. Inst., Techn. Hochschule Darmstadt ; Max-Planck Inst., Züchtungsforsch., Ladenburg am Neckar]

This study on reaction of plants to moisture conditions was part of a study of the factors determining sugar-beet yields. Young plants of several varieties of sugar-beet were examined. In damp weather the viscosity of the protoplasm was highest in tetraploid, lowest in triploid and intermediate in diploid plants. As the soil dried out, the viscosity rose, the greatest rise occurring in tetraploid plants and in the variety Kleinwanzleben N and the least in triploid plants and the variety Kleinwanzleben E. With a rise in soil moisture, the viscosity fell most in the young leaves.—M.P.

1113 Costa, L. and Rui, D. Anomalie da diserbanti nella bietola da zucchero. [**Abnormalities in sugar-beet caused by herbicides.**] *Ital. agric.* 1958, **95,** No. 1, 75–8, bibl. 2, illus.

Abnormalities caused to sugar-beet plants by 2,4-D treatment applied to nearby weeds are described. In the case of both field and experimental plots, the weeds were treated in a light breeze, when the sugar-beet plants had their first few leaves. Although in the experimental plots 50–60% of the sugar-beet plants were affected, 2 months after treatment all the plants appeared to be normal.—E.B.O.

1114 Campbell, G. K. G. **Some responses of sugar beet to gibberellic acid.** *Publ. Inst. internat. Rech. Better. 21st Winter Meet.* [n.d.], pp. 2. [Received March, 1958]

In glasshouse experiments, sugar-beet plants were kept in warm, long-day conditions, under which all controls remained in the rosette stage ; treatment with gibberellic acid produced stem elongation in most plants and flowering in a few. Results indicated that prolonged treatment was necessary to maintain stem elongation and that frequent small doses were more effective than higher doses applied less frequently. In a field trial, 3 sugar-beet varieties, of which one was highly resistant to bolting, were sown on 9 Apr. In the untreated control plots they produced 0, 1 and 11% of bolters. Gibberellic acid was applied

in various concentrations to each experimental plant in an aqueous spray of about 0·6 ml., directed into the middle of the foliage, once, twice, or 4 times per week, for 8 weeks. In the 3 treatments with total doses of 120 micrograms per plant, there was no obvious effect. The most effective treatment (total dosage 1·92 mg./plant, 4 doses per week) induced visible stalk formation on 76–86% of the treated plants ; in the very resistant variety none of these bolters flowered, whereas in the most susceptible variety 11% of the plants did flower. The best differentiation between the varieties was achieved by the treatment with the dose of 480 micrograms per plant applied 4 times a week. At the end of this treatment, the 3 varieties had 1·1, 9·3 and 36·9% of bolters, respectively. It is concluded that treatment with gibberellic acid in the doses used, can only partially replace the normal cold period required for vernalization with the varieties tested, as in most cases some stem elongation was induced but few plants flowered. In the field, however, the indications were that it may be possible to distinguish between types more or less resistant to bolting even in the absence of the climatic factors which normally induce bolting.—E.B.O.

1115 Edinburgh and East of Scotland College of Agriculture. Field Experiments Committee. **Experiments on level and time of application of nitrogenous fertiliser for sugar beet, 1954 to 1956.** *Tech. Bull. 22 Edinb. E. Scot. Coll. Agric.* 1957, pp. 12, bibl. 2.

From the results of 10 trials it was concluded that in the sugar-beet-growing areas of south-east Scotland the yield of sugar is unlikely to be increased by applying N in excess of 90 lb./ac. The average increase in yield of tops was 0·7 tons/ac. for 45 lb. N as 2·7 cwt. nitrochalk (15·5% N) and 1·8 tons/ac. for 90 lb. N. as 5·4 cwt. nitrochalk. The time of application of the extra nitrogen did not affect the results.—M.P.

1116 Holmes, J. C. **Nitrogen fertilizer for sugar beet. Scottish results.** *Brit. Sug. Beet Rev.* 1957, **26,** No. 2, 79–81, bibl. 3.

From 3 series of trials with sugar-beet during 1948–56 it is concluded that under conditions in south-east Scotland about 4 cwt. sulphate of ammonia per ac., accompanied by phosphate and potash, is the optimal dressing for sugar yield. Where beet tops are used for stock feed, an increase in yield of tops of 1–2 tons per ac. is obtainable by applying an additional 2 cwt. sulphate of ammonia.—E.B.O.

1117 Kolbe, G. Über den Einfluss der Stickstoffdüngung auf Ertrag, Zuckergehalt und stickstoffhaltige Substanzen der Zuckerrübe. [**The influence of nitrogen application on the yield, sugar content and nitrogenous compounds of sugar beet.**] *Z. landw. Versuchs- u. Untersuchwes.* 1956, **2,** No. 6, 457–77, bibl. 34, English and Russian summaries. [Inst. Pflanzenernähr. u. Bodenkunde, Univ. Halle] [Received March, 1958]

In the trials, P- and K- applications were kept constant. With increasing applications of N (150–300 kg./ha.) the yields of roots, tops and particularly of leaves were increased. The water content of the sugar-beet, the amount of nitrogenous compounds in the plant, and the proportion of soluble N were also increased. Sugar content fell with all rates of N application, but the yield of sugar rose with up to 150 kg. N/ha ; higher rates of N reduced the yield of sugar. The effects of N as ammoniated nitrate of lime or ammonium sulphate were similar.—M.P.

1118 Grunes, D. L. and others. **Proportionate uptake of soil and fertilizer phosphorus by plants as affected by nitrogen fertilization : 2. Field experiments with sugar beets and potatoes.** *Proc. Soil Sci. Soc. Amer.* 1958, **22,** No. 1, 49–52, bibl. 12. [S. Dakota Agric. Exp. Sta., Brookings]

P uptake from bands of concentrated superphosphate by potatoes and sugar-beet grown under irrigation was increased by added N fertilizer. The percentage of total plant-P derived from the fertilizer bands tended to decrease as the growing season advanced. Experiments with sugar-beet showed that the percentage of total plant-P derived from the fertilizer tended to increase as yields increased. [See also Abs. 973.] F.S.—R.B.

MANGELS

1119 Hörberg, Y. Weibulls Äring Barres, Stam 57. [**Weibull's Aring Barres mangel, strain 57.**] *Weibull's Årsb.* 1958, **53,** 32.

In trials at Weibullsholm during 1950–7, the mean dry-matter yields of the roots of Weibull's Äring Barres mangel strain 57 and Barres Ferritslev mangel were 12·6 and 12·1 hkg./ha. with dry-matter contents of 12·82 and 12·91% respectively. Weibull's Äring is regarded as a replacement for Weibull's Cylinder Barres mangel, compared with which, it has given 10% higher dry-matter yields.—P.J.B.

POTATOES

See also Abs. 1049, 1118, 1219, 1221, 1234, 1307, 1322, 1324, 1329, 1333

1120 Ivins, J. D. and Montague, V. J. **Note on the influence of depth of soil covering the parent tuber on the development and yield of the potato plant.** *Emp. J. exp. Agric.* 1958, **26,** No. 101, 34–6, bibl. 6. [Sch. Agric., Univ. Nottingham]

The depth of soil overlying the seed tuber at

planting time was found to affect, in particular, the number of tubers produced by potato plants. Shallow coverings led to an increase in the average numbers of tubers per plant, with consequent general reduction in size. Possible explanations based on environmental effects are given and the possibility of the application of this phenomenon to ware and to seed production is discussed. F.s.—M.P.

1121 SALZMANN, R. Über die Versuchstätigkeit im Kartoffelbau der Berglagen. [**Experiments in potato cultivation in mountain regions.**] *Mitt. schweiz. Landw.* 1957, **5,** No. 11/12, 199–207, bibl. 10, illus. [Eidg. Landw. Versuchsanst., Zürich-Oerlikon]

The paper reviews results of experiments conducted over the past 25 years at altitudes between 980 and 1950 m. The review is mostly concerned with the conditions required for the production of seed potatoes in mountainous regions and the testing of varieties.—D.B.

1122 STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR, DENMARK. Vanding mod tørke og nattefrost i tidlige kartofler. Foreløbig meddelelse. [**Irrigation for preventing damage from drought and frost in early potatoes. Preliminary report.**] *Medd. 565 Stat. Forsøgsvirk. Plantekult.* 1957, pp. 2.

In trials at one location in Denmark during 1952–6, early potatoes were grown either with or without supplementary sprinkler irrigation, applied mostly on occasions when night frosts were expected, and also in some cases when spring rainfall was deficient. Total amounts of supplementary water applied ranged from 5 to 79 mm. during May and June. Harvesting took place (a) in mid-June and (b) 12 days later. Mean tuber yields with and without irrigation during the 5-yr. period were 114 and 81 hkg./ha. at harvest date (a) and 193 and 143 hkg. at harvest date (b), respectively. During 2 years when spring frosts were prevalent, the mean yield of crops grown with and without irrigation were 130 and 68 hkg. at harvest date (a) and 182 and 97 hkg. at harvest date (b), respectively. The mean yield increase following irrigation was highly significant. In 1952, irrigation in early morning protected crops against temperatures of –2°C. at a height of 20 cm. above ground. The presence of wet soil also, in itself, gave some protection against frost.—P.J.B.

1123 ULRICH, G. Ertragssteigerung bei Kartoffeln auf schweren Böden durch Frühpflanzung und Vorbehandlung des Pflanzgutes. [**Yield increases obtained from potatoes grown on heavy soils by early planting and pre-treatment of the seed tubers.**] *Z. Acker- u. PflBau* 1957, **104,** No. 2, 145–68, bibl. 59.

Experiments on date of planting and pre-sprouting of seed potatoes were carried out on a good, heavy, clay soil in Kreis Weimar at an altitude of about 1000 ft. By bringing forward the date of planting of Ackersegen and Capella from end of April or beginning of May (hitherto considered the optimal date) to early April, yields were increased by 15% (average of all experiments with and without pre-sprouting). The highest yields were obtained from combined early planting and pre-sprouting, but of these, early planting was the more important. Pre-sprouting counteracted the loss in yield from late planting. In another series of experiments, 3 pre-planting treatments were compared. Increases in yield (average for all dates of planting) from these were: (a) breaking dormancy, 5% ; (b) pre-sprouting, 13% ; (c) pre-sprouting to the root-formation stage, 15%. Confining results to the early-planting date (1 April), yield increases were respectively : 26, 32, and 33%. For practical farming, breaking dormancy is the easiest of the treatments to carry out and has the advantage that it can be followed by machine planting. When combined with early planting the yields are not far below those obtained by pre-sprouting. The higher yields resulting from early planting were obtained despite low soil-temperatures, slow emergence and late frosts.—D.B.

1124 LÜDDECKE, F. Bericht über die Ergebnisse der anbautechnischen Feldversuche zur Kartoffelpflanzguterzeugung aus den Jahren 1954 und 1955. [**Report of the field trials in 1954 and '55 on methods for growing seed potatoes.**] *Z. landw. Versuchs- u. Untersuchwes.* 1956, **2,** No. 5, 388–99, bibl. 10, Russian and English summaries. [Rostock] [Received March, 1958]

Of 7 methods tested for the production of seed potatoes in Eastern Germany, 4 were found satisfactory. These were : (a) planting potatoes which are on the point of sprouting ; (b) planting pre-sprouted potatoes, before 1 May, followed by early and strict rogueing, harvesting the crop when the vines were dying ; (c) planting potatoes on the point of sprouting as early as possible ; early and strict rogueing ; followed by pulling of the tops *c.* 10 days after flowering, and harvesting about 2 weeks later, (in (c), yields of seed potatoes were only 50–60% of those from (a) ; but subsequent crop yields were higher) ; (d) harvesting the early varieties during full-bloom, the quick-flowering late varieties 8 days after flowering, and the long-flowering late varieties at the end of flowering. Methods employing late-planting (July-August) proved unsatisfactory.—M.P.

1125 ODLAND, T. E. and SHEEHAN, J. E. **A comparison of sod crops for use in rotation with potatoes.** *Amer. Potato J.* 1957, **34,** No. 11, 312–14, bibl. 3. [Rhode Island Agric. Exp. Sta., Kingston]

Katahdin potatoes were grown in a 4-yr.

rotation with *Agrostis alba*, *Phleum pratense*, *A. alba*/*P. pratense*, *P. pratense*/*Trifolium pratense*, *P. pratense*/*T. hybridum* and *A. alba*/*T. hybridum*. The sod crops were grown for 2 years and were followed by 2 years of potatoes. The sod crops were clipped periodically and the clippings left on the ground. The average yield of first-grade ware potatoes for the period 1953–6, inclusive, varied from 478 bu./ac. following *P. pratense* to 552 bu./ac. following *A. alba*. Combinations including *A. alba* were more effective than those including *P. pratense* in increasing yields of potatoes in the rotation. There were no appreciable differences in the sp. gr. of the potatoes grown in any of the rotations. F.S.—R.B.

1126 National Institute of Agricultural Botany, Cambridge. **Varieties of potatoes.** *Fmrs' Leafl. 3 N.I.A.B.* 1958, pp. 6.

Tuber- and field-characters of potato varieties recommended for general and special-purpose use in Britain are listed and described and notes are given on seed-potato certification. Recommended varieties are : first earlies—Arran Pilot, Home Guard, Ulster Premier, Ulster Chieftain, Ulster Prince; second-earlies—Craigs Alliance, Craigs Royal, Ulster Dale and Doon Star ; main crop varieties—Arran Viking, King Edward, Majestic, Ulster Supreme, Orion.—M.P.

1127 Ministry of Agriculture, Northern Ireland. **Reports from the counties. Potato variety trials.** *Mon. Rep. Minist. Agric. N. Ire.* 1958, **32**, No. 10, 305–6.

In main-crop variety trials at 17 centres during 1957, Ulster Torch gave the highest total yield, and the highest yield of ware, seed and diseased tubers. It was followed by Ulster Supreme which gave a low yield of seed potatoes, whereas Dr. McIntosh gave a higher yield of seed and chats but a lower yield of ware and diseased tubers. Arran Peak was the lowest yielder but was least affected by disease.—M.P.

1128 Statens Forsøgsvirksomhed i Plantekultur, Denmark. Forsøg med tidlige, brokimmune sorter af spisekartofler 1955–57. [**Trials with early, wart-immune varieties of culinary potatoes 1955–7.**] *Medd. 590 Stat. Forsøgsvirk. Plantekult.* 1958, pp. 4, illus.

The trials reported were carried out at one location on medium-heavy clay-loam and at 2 locations on sandy-loam soil in Denmark, using 1 white-fleshed and 6 yellow-fleshed varieties. Planting was done as soon as conditions permitted ; harvesting took place in the first week of July, again 2 weeks later, and finally at full maturity. Primula was used as a standard. At the first date of harvesting, Primula was outyielded only by Doré with 7% higher average yields, in terms of tubers with a diam. over 3 cm. In terms of total tuber yields, Tylstrup 48347 and Doré gave 7 and 1% higher yields, respectively. At the 2nd harvest date, Primula gave the highest average yield of tubers over 3 cm. in diam. and outyielded Tylstrup 48347 by 2%. Tylstrup 48347 gave 4% higher total tuber yields. At the 3rd harvest date, Tylstrup 48347 gave 1% higher yields of tubers over 3 cm. in diam. than Primula and 5% higher total tuber yields. Other varieties tested included : Tylstrup 48271, Sirtema, Sommerkrone and Eva (white-fleshed). Data are given of dry-matter and ascorbic-acid contents, mealiness, taste and tendency to blacken on cooking, together with brief notes on each variety.—P.J.B.

1129 Keller, E. R. Das schweizerische Richtsortiment im Kartoffelbau 1957/58. [**The Swiss official list of potatoes for cultivation in 1957/8.**] *Mitt. schweiz. Landw.* 1958, **6**, No. 1, 4–10.

Tabulated information is given showing the properties of potato varieties suitable for large-scale cultivation. For each variety the data include : the breeder ; soil requirements ; earliness; suitability for pre-sprouting ; disease resistance ; yield, shape, and starch content of tubers ; colour of flesh ; cooking type ; and storage qualities. The following varieties are free, or almost free, from the tendency to blacken after boiling : Saskia, Sirtema, Eersteling, Frühbote, Bintje, Urgenta, Fina, Augusta, Benedikta, and Maritta.—D.B.

1130 Krijthe, N. Kieming van pootgoedpartijen met " glas ". [**Sprouting of " glassy " seed-potato samples.**] *Meded. N.A.K.* 1958, **14**, No. 10, 116. [Inst. voor Bewaring en Verwerking v. Landbproducten]

Seed potatoes which have been left in the ground for some time after defoliants have been applied sometimes produce fresh growth above ground. Portions of some of these tubers have a translucent appearance when sectioned (' glassy ' potatoes). The percentage of such tubers in a crop can be 40% or more. Experiments were carried out on crops of Bintje and Eigenheimer potatoes in which glassy or partly glassy tubers comprised 14–37% of the crop. Samples were cut lengthwise in order to determine their condition, and the tubers were classified into 7 groups : (a) skins containing liquid, (b) rotten tubers, (c) glassy tubers, (d) tubers glassy at one end only, (e) tubers whose top or eyes showed that growth had occurred, but of normal appearance on sectioning, (f) secondary tubers which had grown out of other new tubers, (g) normal tubers. Tubers in categories (d), (e) and (g) sprouted quickly, with a large number of sprouts per tuber. Partly glassy tubers sprouted well ; sometimes the glassy portion produced weak shoots while the good portion produced strong shoots. In outward appearance and sprouting ability it was scarcely possible to distinguish be-

tween tubers of types (d) and (e). The secondary tubers had a low sp. gr. and were slow to sprout. When stored for 4 weeks at 15°C. they sprouted much more vigorously than when taken direct out of cold storage. Completely glassy potatoes tended to deteriorate during storage, and liquefied when stored at 2°C. especially if bruised or damaged. They became rotten when stored above 2°C. Glassy potatoes appeared to sprout better if the skin on the tuber was relatively thick. Rotten potatoes, if they sprouted at all, produced thin or needle-like shoots. Partly glassy potatoes did not deteriorate during storage. It was recommended that potatoes of groups (a), (b) and (c) be rejected for seed purposes ; as they are of lower sp. gr. than partly glassy or sound tubers, they can be separated by differential flotation in a brine bath of sp. gr. 1·04 for Bintje and 1·05 for Eigenheimer without detriment to their sprouting capacity.—R.B.

1131 Permin, O. and Petersen, H. I. Forsøg med ukrudtsbekæmpelse i kartofler. [**Weed control trials with potatoes.**] *Tidsskr. Planteavl* 1957, **61**, No. 4, 638–66, English summary.

The results of 2 series of trials with 2,4-D and MCPA Na salts are reported. In the first series, carried out during 1949–55, these herbicides were applied at rates of 1 kg. active material/ha. at the following stages: (a) 2–4 days after planting, (b) at emergence, (c) 4–6 cm. high, and (d) at the start of flowering. The use of MCPA at stages (a) and (b) increased average tuber yields by 3%, while spraying at later stages reduced yields ; with 2,4-D, all treatments, except at stage (a), reduced tuber yields. Where weeds were present, average tuber yields were increased 4% by treatment with MCPA at stages (b) or (c) and by 4 and 5%, respectively, following treatment with 2,4-D. The best control of weeds followed treatment at stage (b). In the second trial series during 1951–5, potatoes were sprayed immediately before emergence with MCPA or 2,4-D at rates of 0·5, 1, 2 or 4 kg. active material/ac. Treatment with 0·5 or 1 kg. MCPA/ha. resulted in average tuber yield increases of 1% ; all other treatments, including those with 2,4-D, reduced yields. Where weeds were present, treatment with 1 kg. MCPA/ha. resulted in an average of 3% higher tuber yields than untreated controls and reduced weed stands by 66% ; similar treatment with 2,4-D resulted in 1% lower tuber yields than controls and reduced weed stands by 52%. Observations are made on foliar symptoms of herbicidal damage. The treatments had no detectable effect on tuber quality. It was concluded that applying 1 kg. MCPA Na salt/ha. just before emergence was the most effective treatment in these trials ; the use of 2,4-D or MCPA on seed potato crops was thought inadvisable because of the similarity between the foliar symptoms of virus infection and herbicidal damage. Neither herbicide had any residual effect on the growth and development of plants grown from tubers from treated crops. In studies on cultivation for controlling weeds, the average tuber yield of uncultivated crops was 259 hkg./ha., compared with 293 hkg./ha. for crops covered, harrowed once or twice, hand-hoed, cultivated between the rows and finally earthed up.—P.J.B.

1132 Nylund, R. E. [Summarizer] [**Weed control in**] **Onions, potatoes, and root crops.** [12 abstracts] *Res. Rep. 14th N. Cent. Weed Contr. Conf.* [*USA*] 1957, 125–31.

In trials in British Columbia, the following treatments were made to 8 potato varieties when just starting to emerge : 10 lb. dalapon + 3 lb. dinoseb amine salt and 10 and 30 lb. dalapon in 30 gal. spray/ac. The dalapon + dinoseb treatments controlled most grass and broad-leaved weeds, except *Fagopyrum tataricum*, *Rumex acetosella* and *Polygonum aviculare* ; 30 lb. dalapon/ac. controlled all grasses and most other weeds, except *F. tataricum* and *P. aviculare*. No variety of potato showed injury, except White Rose, which showed leaf crinkle and reduced tuber yields after treatment with 30 lb. dalapon/ac. In trials in Indiana on weed control in sweet-potatoes [*Ipomoea batatas*], herbicides were applied in 100 gal. spray/ac. immediately after planting in a fine, sandy soil ; 6·2 in. rain fell during the following 8 days. Treatment with 8 lb. neburon/ac. gave 86% control of *Digitaria sanguinalis* and 97–100% control of *Mollugo verticillata*. There was no apparent crop injury.—P.J.B.

1133 Vekemans, J. Méthodes de lutte contre les ennemis du tabac et de la pomme de terre. [**Methods for controlling diseases and pests of tobacco and potato (in the Belgian Congo).**] *Bull. Inform. I.N.É.A.C.* 1958, **7**, No. 1, 1–29, illus. [Sta. Essais de Kaniama, Belgian Congo]

The results are given from trials on ways of applying treatments (spraying, dusting and soil fumigation) and, with regard to the potato, with measures for controlling *Alternaria solani*, *Pseudomonas solanacearum*, and pests of leaves, roots, and of tubers in storage.—E.B.O.

1134 De Segura, C. B. and others. Comparativo de fungicidas para el control del "hielo" de la papa. [**Comparison of fungicides for controlling *Phytophthora infestans* on the potato.**] *Bol. trim. Exp. agropec., Lima* 1957, **6**, No. 1, 13–16. [Esta. Exp. Agric., La Molina, Peru]

In plot trials, 0·25% manzate and 0·25% dithane, applied as spray, were best and gave effective control. In the plots treated with these preparations, the tuber yield was approx. 20,000 kg./ha., compared with 8299 kg. in the control plots.—E.B.O.

1135 Pond, D. D. and Chisholm, D. **Influence of weathering on DDT coverage in a potato spray program.** *Canad. J. Pl. Sci.* 1958, **38**, No. 1, 81–3, bibl. 5. [Fld Crop Insect Section, Entomol. Lab., Fredericton, N.B.]

Weathering caused most of the early reduction in deposits of DDT sprayed on potato foliage in experiments in 1953 and 1954. During July and August, plants in the field lost 26 – 63% of initial DDT deposits within 24 hr. after spraying. This was significantly greater than that lost by comparable plants under greenhouse conditions. F.s. —D.B.

1136 Statens Forsøgsvirksomhed i Plantekultur, Denmark. Kartoffel virus X og S i de almindeligt dyrkede kartoffelsorter. [**Potato virus X and S in commonly-grown potato varieties.**] *Medd. 578 Stat. Forsøgsvirk. Plantekult.* 1957, pp. 4.

1137 Brücher, H. Kritische Betrachtungen zur Nomenklatur argentinischer Wildkartoffeln. 4. Die Serie *Tuberosa*. [**Critical observations on the nomenclature of the wild potatoes of Argentina. 4. The *Tuberosa* series.**] *Züchter* 1957, **27**, No. 8, 353–7, bibl. 15, illus. [Univ. Nacional de Cuyo, Mendoza, Argentina]

See also *Fld Crop Abstr.* 10 : 1476.

1138 Landi, R. La rindite stimola la germogliazione della patata. [**Potato sprouting is stimulated by rindite.**] *Ital. agric.* 1958, **95**, No. 3, 161–4, illus.

In a trial near Rome, tubers of the potato varieties Majestic, Tonda di Berlino and Saskia, in the dormant stage, were treated on 21 Oct. by fumigation with rindite, 100 cc. per cu. m. of tubers, for 48 hr. Part of the treated tubers were germinated in a room and part were placed in the soil. Results showed that rindite treatment was effective in breaking dormancy. The average lengths of the longest sprouts from the treated tubers placed in the soil were : Majestic 8 cm., Tonda di Berlino 6·1 cm., and Saskia 10 cm., while in the untreated controls they were 1, 0 and 5 cm., respectively.—E.B.O.

1139 Klimaševskiĭ, E. L. **The formation of aerial tubers in potato.** [Russian] *Priroda, Moskva* (*Nature, Moscow*) 1958, **47**, No. 3, 113, illus. [Ural Sci. Res. Inst. Agric., Sverdlovsk]

On plots of the above Institute aerial tubers have been found on a potato plant (variety Berlihengen) which had no underground tubers. During the vegetative period, the roots were severely damaged by wireworms and perished. As a result of the interruption in nutrient supply, tubers (a total of 32) were formed in each of the leaf axils, the larger tubers weighing 36 g. and having from 4 to 7 eyes. The tubers had no taste of solanin and their starch content varied from 13·6 to 15·8%. The normal tubers of the Berlihengen variety are reddish ; the aerial ones were green, but after they had been stored in a dark, warm place for 6 days, they turned red.—M.H.

1140 Gausman, H. W. and others. **Effects of chloride and sulfate on ^{32}P uptake by potatoes.** *Agron. J.* 1958, **50**, No. 2, 90–1, bibl. 6. [Maine Agric. Exp. Sta., Orono]

Potato plants were grown in pot cultures containing 0·8 mc. of ^{32}P and varying concentrations of Cl- and SO_4-ions. As the Cl-concentration was increased, ^{32}P-uptake increased until the Cl-concentration was 300–450 ppm. As SO_4-concentration was increased, ^{32}P-uptake decreased. F.s.—R.B.

1141 Tamaki, K. and Naka, J. **The effect of 2,4,5-T foliage sprays on the variations of the chemical components of potato plants.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1957, **26**, No. 2, 128–9, bibl. 9, English summary. [Kagawa Univ.]

The effect of spraying with 0·02% 2,4,5-T Na salt on the carbohydrate- and N-content of potato plants was studied. The usual symptoms appeared after 12 hr. Growth in the sprayed plants was at first retarded, but after 10 days recovered sufficiently to overtake the growth in the control plots. The results of chemical analyses suggest that the physiological role of the tops as a temporary storage organ for the products of assimilation was [at first] postponed and [later] intensified as a result of spraying with 2,4,5-T. F. Eng. s.—D.B.

1142 Unrau, A. M. and Nylund, R. E. **The relation of physical properties and chemical composition to mealiness in the potato. 2. Chemical composition.** *Amer. Potato J.* 1957, **34**, No. 11, 303–11, bibl. 30. [Minnesota Agric. Exp. Sta., St. Paul]

Chemical characteristics positively correlated with mealiness were (a) dry-matter content, (b) starch content, (c) amylose content ; those negatively correlated were content of sugar and polysaccharides, and of low-molecular-weight nitrogen compounds. Mealiness was apparently not associated with the content of crude protein or ash. [See also Abs. 11 : 690.] F.s.—R.B.

1143 Hughes, J. C. **Chlorogenic acid in the potato.** *Chem. and Industr.* 1958, No. 8, 214–15.

According to a paper read at a meeting of the Plant Phenolics Group of the Society of Chemical Industry, an investigation on the chlorogenic-acid content of potatoes was started because of the possible connexion between this and stem-end blackening in cooked potatoes. A method for the determination of chlorogenic acid is described. Blackening in cooked potatoes decreased from the stem end to the rose end while the chlorogenic-acid content was high at the stem end, it fell to a

low value near the rose end and rose again to about half its peak value at the rose end. Preliminary results from trials on shading potato plants in the field showed that there are more total phenols in the unshaded plants (and in "blackening" varieties of potatoes) than in the shaded ones; a similar trend is also apparent in the chlorogenic-acid content.—E.B.O.

1144 Morgan, D. G. and Mees, G. C. **Gibberellic acid and the growth of crop plants.** *J. agric. Sci.* 1958, **50**, Pt 1, 49–59, bibl. 12. [Imp. Chem. Ind., Jealott's Hill. Res. Sta., Bracknell, Berks]

Spraying gibberellic acid at 2 and 4 oz./ac. on potatoes, var. Majestic, 3 weeks before flowering increased the growth of the tops and the number of tubers, but caused a reduction of *c.* 30% in the total weight of tubers harvested. Some of the tubers were malformed and U-shaped. Similar rates sprayed on to turnips at an early stage of root formation stimulated the growth of the aerial parts, but did not increase crop yield. [See also Abs. 927.]—M.P.

1145 Bourdier, L. Fumure localisée sur pommes de terre. [**Localized manuring of potatoes.**] *Potasse* 1958, **32**, No. 253, 59–60, illus.

In 2 years' trials a complete fertilizer 10–10–20 was applied to the potato variety Bintje at the rate of 500 kg./ha. Results showed that the yield from placing the fertilizer in the row was 6% higher, on average, than that obtained from broadcasting it.—E.B.O.

1146 Black, W. N. and Cairns, R. R. **The effect of varying levels of nitrogen, phosphorus and potassium and manure on the yield and starch content of potatoes.** *Canad. J. Soil Sci.* 1958, **38**, No. 1, 1–7, bibl. 5. [New London Illustration Sta., Prince Edward Island]

Potatoes were grown in a 4-yr. rotation with oats, clover and timothy for hay in an 8-yr. experiment. Green Mountain potatoes were grown in the first cycle of the rotation and Canso in the second. NPK combinations of 45, 90 and 135 lb.N/ac., 120, 180 and 240 lb. P_2O_5/ac. and 75, 150 and 225 lb. K_2O/ac. were applied before potato planting in both cycles. Half of the plots received f.y.m. at 10 tons/ac. applied to the timothy sod before autumn ploughing. Applications of f.y.m. increased the yields of marketable potatoes by 39·5 and 78·8 bu./ac. respectively in the first and second rotation cycles. There was no significant interaction between f.y.m. and fertilizer treatments. Increased N and K significantly reduced the starch content of the tubers but increased yields in proportion to the amounts applied. P applied at more than 120 lb. P_2O_5/ac. produced no significant yield increase during the first rotation cycle; during the second cycle applications of up to 240 lb. P_2O_5/ac. gave significant yield increases without appreciably affecting tuber quality. F.S.—R.B.

1147 Bakermans, W. A. P. Late bladbemesting met P en K op aardappelen en bieten. Enkele orienterende proeven in 1955 en 1956. [**Late applications of leaf sprays of P and K to potatoes and beet. Some exploratory trials in 1955 and 1956.**] *Landb Voorl.* 1957, **14**, No. 11, 598–606, bibl. 10. [Inst. Biol. Chem. Res., Wageningen]

From the trials described, in which leaf sprays of P or K were applied to potatoes and beet approximately one month before harvesting, it appears that, in general, this form of manuring gives practically no result in the Netherlands, probably because of the normally heavy manuring of the Dutch arable lands and their consequent high state of fertility.—G.M.R.

1148 Burkhardt, H. Über die Gründüngungswirkung verschiedener Untersaaten. [**The green-manuring action of several undersown crops.**] *Z. Acker- u. PflBau* 1957, **104**, No. 3, 315–26, bibl. 7. [Inst. z. Steigerung der Pflanzenerträge, Paulinenaue, E. Germany]

The highest potato yields were obtained after green manuring with *Ornithopus sativus*. *Trifolium pratense* alone was less efficient as a green manure for potato than *Melilotus alba* or a mixture of *T. pratense*, *T. repens* and *T. hybridum*. Using the leguminous crop as a fodder crop scarcely reduced its green-manuring value. Of the non-legumes, fodder mallow (*Malva* sp.) was a good green manure.—D.B.

1149 Ueno, S. **The estimation of yield in potato.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1957, **26**, No. 2, 126–7, English summary. [Kyoto Univ.]

The object was to determine the number of plants required for estimating potato yield. It was concluded that the most practical method was to take a random sample of about 50 groups of 5 plants or 30 groups of 10 plants and multiply their mean [number of tubers] by the total number of plants in a field. F. Eng. S.—D.B.

1150 Statens Forsøgsvirksomed i Plantekultur, Denmark. Behandling af kartofler mellem optagning og vinteropbevaring. [**The treatment of potatoes between harvest and winter storage.**] *Medd. 583 Stat. Forsøgsvirk. Plantekult.* 1957, pp. 4.

In 7 trials in Denmark, potatoes were stored in temporary field clamps from the date of harvest until removal, in November, to winter storage quarters in houses or clamps. The percentage losses in both weight and dry matter were 2·4% and the proportion of tubers showing infection by

blight [*Phytophthora infestans*] increased considerably during this period. In 9 trials, potatoes were either : (a) stored in temporary field clamps before being moved to winter storage quarters, or (b) placed in winter storage quarters immediately after harvest. The potatoes were then stored during the whole winter. Losses in tuber weight following treatments (a) and (b) were 2·9 and 3·7% and dry-matter losses were 7·2 and 7·3%, respectively. In terms of total losses in tuber weight and dry matter, plus diseased tubers, weight losses following treatments (a) and (b) averaged 10·2 and 9·5% and dry-matter losses were 14·4 and 12·7%, respectively. In further trials during 2 years, treatments (a) and (b) were combined with (c) mechanical ventilation of storage houses (except in frost) and (d) natural ventilation through ducts (except in frost). Treatments (a) and (b), combined with (c) resulted in tuber dry-matter losses of 7·7 and 6·1% and total dry-matter losses of 16 and 14·1% ; with ventilation treatment (d) tuber dry-matter losses were 5 and 3·6% and total dry-matter losses 25·2 and 13·4%, respectively. High incidence of tuber disease following treatment (a) was due to injury on moving, combined with slow healing in the low temperatures of November ; mechanical ventilation greatly reduced such losses.—P.J.B.

1151 PÄTZOLD, C. and KOLB, W. Beinflussung der Kartoffel (*Solanum tuberosum* L.) und der Topinambur durch Röntgenstrahlen. [**The effect of X-rays on potato tubers and Jerusalem artichoke.**] *Beitr. Biol. Pfl.* 1957, **33,** No. 3, 437–58, bibl. 23, illus. [Inst. PflBau u. Saatguterzeugung, Forschungsanst. für Landw., Braunschweig-Völkenrode]

Tubers of 3 size-groups of the potato varieties Bona and Ackersegen, weighing 20–30 g., 40–80 g. and 110–150 g., were irradiated in Dec. 1955 or April 1956 and then stored in a cellar the temperature of which varied with the seasons. The effect of irradiation on potatoes was studied in June '56. Irradiation at 200–16,000 r. inhibited sprouting, but the higher doses were required for effective sprout-inhibition in small- and medium-sized potato tubers. Water- and dry-matter loss was much less in all irradiated tubers than in the controls, after long storage. Irradiation of the crown of potato tubers was more intensive in its effect than irradiation of the distal end.—M.P.

1152 WEBER-DAHLMANN, Marianne. Beiträge zur Einwirkung organischer chemischer Substanzen auf die Lagerfähigkeit von Kartoffeln. [**Contributions on the effect of organic chemical substances on the storage-life of potatoes.**] *Z. Bot.* 1957, **45,** No. 5, 395–420, bibl. 43, illus. [Bot. Inst., Univ. Münster]

In trials with the potato varieties Ackersegen and Bona, the substances which showed promise for increasing the storage-life of potatoes were the commercial products agermin and belvitan K, 2-ethylbutanol, trimethylpentanol and 2-ethylhexanol. The inhibition effected by 2-ethylhexanol (in a 1 : 9, alcohol/water mixture) was reversible by treating the tubers with rindite.—M.P.

SWEET-POTATOES

See also Abs. 1295, 1330

1153 TING, Y. C. and others. **A cytological study of the sweet potato plant *Ipomoea batatas* (L.) Lam. and its related species.** *Amer. Nat.* 1957, **91,** No. 858, 197–203, bibl. 7, illus. [Louisiana State Univ., Baton Rouge]

The hypothesis that the sweet-potato plant was derived from the tropical American plant *I. tiliacea* is disproved on the basis of chromosome numbers and the inability to achieve a single interspecific cross from over 3000 attempts.—G.L.S.

CASSAVA

1154 MIÈGE, J. Essais culturaux sur le manioc. [**Cultural trials with cassava.**] *J. Agric. trop. et Bot. appl.* 1957, **4,** No. 9–10, 402–41.

The results from trials at the Experimental Station at Adiopodoumé, Ivory Coast, during 1951–6, to determine the best methods for growing cassava in the Abidjan region, showed that : (a) the best time for planting cuttings was about mid-March ; (b) K fertilizer increased yields by 23–27% ; (c) the application of wood ashes increased yields by 31% ; (d) with the variety Tabouca, cuttings 45 cm. long were satisfactory ; (e) the average percentage of failures was over 18, and the yield 19 metric tons per ha., using cuttings taken from the branches of third order, while the percentage of failures was 0·55, and the yield 31 tons/ha., using cuttings taken from the base of the principal stem.—E.B.O.

1155 BECK, B. D. A. and CHANT, S. R. **A preliminary investigation on the effect of mosaic virus on *Manihot utilissima* Pohl. in Nigeria.** *Trop. Agric., Trin.* 1958, **35,** No. 1, 59–64, bibl. 14. [Dep. Agric., Ibadan, Nigeria]

Primary infection with cassava mosaic virus significantly reduced the yield. The C : N ratio of leaves from infected plants was greater than in comparable leaves taken from healthy plants, although the actual percentages of carbohydrate and N were less. There were no significant differences between stem and petiole weights or HCN contents of peeled tubers of healthy and diseased plants.—M.P.

YAMS

1156 MIÈGE, J. Influence de quelques caractères des tubercules-semences sur la levée et le

rendement des ignames cultivées. [**Influence of some characters of the seed-tubers on emergence and yield of cultivated yams.**] *J. Agric. trop. et Bot. appl.* 1957, **4,** No. 7–8, 315–42, bibl. 4, illus.

Although variety, climate and soil have a major influence on yam yield, the sanitary condition of the seed, and the type of sett used, have a certain influence which is examined mainly in the variety Suiguié of *Dioscorea alata* grown in the Ivory Coast, W. Africa. The position on the tuber of the portion used for seed, its weight and the tuber weight should be considered. The proximal portions sprout more rapidly, and yield better, than those taken from other parts of the tuber. With *D. alata*, the optimal weight of a sett is about 200 g. for Suiguié and the varieties of the Bété-Bété type, and a little less for those of the N'Za type. Larger setts than these should be used with *D. cayenensis*. With *D. alata*, the setts taken from small tubers sprout more rapidly and yield better than those from large tubers. With *D. cayenensis*, setts should be taken from large tubers. —E.B.O.

COCOYAMS

1157 Purewal, S. S. and Dargan, K. S. **Effect of spacing on development and yield of arum (*Colocasia esculenta*).** *Indian J. agric. Sci.* 1957, **27,** No. 2, 151–62, bibl. 11. [Agric. Sta., Jullundur, Punjab]

Spacing of *C. esculenta* varies according to soil and the length of time the crop remains in the field. Optimum spacing under Punjab conditions (4–8 months in the field) was studied using the variety Did Arbi. In randomized and replicated plots the effect of the following spacings on plant growth was studied : 1·5, 2·0 and 2·5 ft. between rows and 6, 9 and 12 in. between plants. Germination was unaffected by spacing. Wide spacing resulted in taller plants with a greater leaf area and a higher yield per plant of both tops and tubers than did narrow spacing. The per-acre yield was greater under close spacing and the highest per-acre yield was produced (in 1951) from 1·5 ft. × 12 in. This was also the most economic yield, the next best being 2 ft. × 9 in. Yield was highly correlated with plant height and leaf area which were correlated with each other.—D.B.

FIBRE CROPS

COTTON

See also Abs. 1322, 1326, 1335, 1338

1158 Asghar, A. G. and Hafeez Khan, M. A. **Growing of cotton on ridges in reclaimed soils.** *Pakistan J. Sci.* 1957, **9,** No. 5, 219–26, bibl. 4, illus. [Ballehwala Exp. Reclamation Farm, Montgomery District]

In 1953 and '54, cotton (strain 289F/43) was cultivated in reclaimed soils (salt content mostly below 0·2% throughout the profile and pH 9) by the ridge and flat techniques, in each case employing normal sowing rate and spacing. In 1953 and '54, yields were, respectively, 47 and 18% higher from ridged than from flat cultivation. The quantity of irrigation water required and the time taken to irrigate a ridged plot were half that for a flat plot. The ridge method gave a net financial gain after taking the cost of ridging into account. It is noted that ridged cultivation is not likely to prove successful in unreclaimed soils with a high salt-content at variable depths in the soil profile.—D.B.

1159 Dastur, R. H. and others. **The optimum time of sowing cotton in the Dharwar district.** *Indian Cott. Gr. Rev.* 1957, **11,** No. 4, 451–5. [Cotton Physiol. Res. Scheme, Dharwar, India]

The results of 2 sowing-time-cum-manurial experiments carried out on Jaydhar cotton (*Gossypium herbaceum*) at Dharwar in 1952–3 and 1953–4, show that (a) sowing at the end of July produces a higher yield than at the end of August, and (b) manuring with ammonium sulphate tends to produce a better response when combined with early sowings. These results were confirmed by similar experiments on Laxmi cotton (*G. hirsutum*) at Gadag in 1952–3. It is recommended that early sowing should be given a trial in the transition area as well as in the dry eastern tract of the Dharwar district of Bombay-Karnatak. F.S.—D.B.

1160 Nakamura, H. and others. **Studies on the cultivation of upland cotton, especially in regard to its blooming and ripening. 2. Effects of different sowing dates on seed cotton weight and lint weight.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1957, **26,** No. 2, 143–6, bibl. 16, English summary. [Hyogo Univ. Agric.]

1161 Spooner, A. E. and others. **Influence of timing of irrigation on yield, quality and fruiting of upland cotton.** *Agron. J.* 1958, **50,** No. 2, 74–7, bibl. 6. [Arkansas Agric. Exp. Sta., Fayetteville]

The effects of timing of irrigation treatments on the yield, quality and fruiting of upland cotton were investigated during 1955 and '56. Irrigation water was applied when necessary, (a) throughout the season, (b) from the onset of flowering until harvest, (c) from when the first bolls were 20 days old until harvest. There was an unirrigated control. Irrigation increased yields by approximately one bale/ac. Water applied before flowering did not cause a significant increase in yields. Boll maturity was delayed by irrigation. In 1955 there was a significant difference only between (a) and (c). In 1956, irrigation water was used most

efficiently in treatment (c). Irrigation extended the peak fruiting period by 2 weeks but did not affect the number of flowers produced per day. Boll shedding was greatest in all treatments 2 weeks after the peak of flowering. The rate of shedding was significantly reduced by irrigation, and boll size was significantly increased. Irrigation tended to improve the quality of cotton produced. F.s.—R.B.

1162 Korolev, L. I. and others. **New chemicals for pre-harvest removal of cotton leaves.** *Vestn. sel'skohoz. Nauki* (*J. agric. Sci., USSR*) 1958, **3**, No. 1, 82–91, English and German summaries.

The results of tests made with 106 chemical preparations are described. The cotton plants were treated after one or two bolls per plant had opened. Most of the preparations which were effective belonged to two groups of chemicals, namely, the compounds of monochlorocetic acid and hydrazine. F.s.—M.H.

1163 Patel, C. T. and Parmer, M. U. **Effect of soils and climatic conditions on economic characters of the Indo-American cottons tried in Gujarat.** *Indian Cott. Gr. Rev.* 1958, **12**, No. 1, 15–19, bibl. 2. [I/C Scheme for Interspecific Hybridization in Cottons, Surat]

The effects of soils and climate on yield, ginning out-turn, fibre length and fibre weight have been studied. High yield and superior fibre quality were associated with well distributed rainfall. The Indo-American cottons are shallow-rooted. They fare better in light and well drained soils under rain-fed conditions, but for high yield and assured quality supplementary irrigations are necessary. F.s.—D.B.

1164 Ryžov, S. N. [**Research work at the All-Union Scientific Institute for Cotton Production during 1956.**] [Russian] *Bjull. Naučno-tehnic. Inf. Sojuz. NIHI* (*Bull. Sci.-tech. Inf., All-Union Inst. Cotton Prod., Taškent*) 1957, No. 1, 3–31.

The work on *Gossypium* spp. is described under sections which include : pre-sowing cultural measures, sowing dates, square-pocket sowings, fertilizers, cotton/lucerne rotations, measures to hasten plant development, cultural measures for the lowland and foot-hill zones in Uzbekistan, improving salty areas, and plant selection.—M.H.

1165 Tursunhodžaev, Z. [**Agronomic and improvement measures for ensuring good harvests of cotton in the Hungry Steppe.**] [Russian] *Bjull. Naučno-tehnic. Inf. Sojuz. NIHI* (*Bull. sci.-tech. Inf. All-Union Inst. Cotton Prod., Taškent*) 1957, No. 1, 53–72.

In the Hungry Steppe (located in the territories of the two Republics Kazahstan and Uzbekistan) there are 200 thousand ha. of irrigated lands. The cotton harvests in many areas amount to 3000–4000 kg./ha. and it is claimed that the potential fertility of the soil in this Steppe is not fully utilized. Measures adopted by the Pahta-Aral Experiment Station in collaboration with some State and collective farms for improving cotton yields under irrigation in the Hungry Steppe are described, with special reference to a cotton/herbage rotation, the sowing of a lucerne/grass mixture in a cotton rotation, autumn tillage, irrigation norms, and the use of fertilizers.—M.H.

1166 Gutiérrez, M. Estado actual de los trabajos de mejoramiento del algodón en los Estados Unidos. [**Present state of work on cotton improvement in the USA.**] *Idia* 1957, No. 115, 1–40, illus. [Esta. Exp. Nac., Presid. R.S. Peña, Chaco, Argentina]

This report results from one study-year in the USA, mainly at the Cotton Section of the Texas Agricultural Experiment Station. Information is given on research and varieties of cotton.—E.B.O.

1167 Avtar Singh, and Negi, L. S. **Improved strains of Punjab American cotton. 3. H.14.** *Indian Cott. Gr. Rev.* 1958, **12**, No. 1, 2–9, bibl. 4, illus. [Cotton Res. Sta., Hansi, Punjab]

H-14, a new improved strain of Punjab American cotton, is a re-selection from 216F, which until recently was the recommended variety. In extensive trials carried out on the various Departmental Farms and on cultivators' fields, H-14 has invariably outyielded 216F by an average margin of 1·25 to 1·5 mds. of seed cotton per ac. [1 maund = 82 lb.] It gins about 1·5% more than 216F and also possesses finer and stronger fibre. The seed cotton of H-14 has a fluffy and attractive appearance and fetches a premium of up to Rs. 2 per md. H-14 matures about 2 weeks earlier than 216F. This results in a saving of one irrigation and enables the sowing of a winter crop, e.g. wheat and gram [*Cicer arietinum*], immediately after cotton. A random survey, carried out in 12 villages in the neighbourhood of Hansi during 1956–7, showed that 78% of the fields sown with H-14 were winter-cropped later, mostly by gram. The early maturity of H-14 enables the crop to escape the attack of pink bollworm [*Platyedra gossypiella*], which is a serious pest of cotton in Hariana tract. F.s.—D.B.

1168 Gutknecht, J. and Roux, J. B. La multiplication des variétés Allen 150 et 151 au Tchad. [**The multiplication of the cotton varieties Allen 150 and 151 in the Chad.**] *Cot. et Fibr. trop.* 1957, **12**, No. 2, 173–90, illus.

Allen 150 is multiplied in north Ubangi and Allen 151 in north Cameroons. These 2 cotton varieties will be grown throughout the cotton area of the Chad in 1958–9 in lieu of Allen common type. Allen 150 and 151 yield 10–15% more seed cotton than Allen common type, and their ginning return is about 37% (Allen common type 29%). F.s.—E.B.O.

1169 Gutiérrez, M. and others. Ensayos de herbicidas en algodón. [**Herbicidal trials with cotton.**] *Idia* 1957, No. 116, 11–17, bibl. 7, illus. [Esta. Exp. Pcia. R. Sáenz Peña, Chaco, Argentina]

An account is given of preliminary trials in 1955–6 to test various herbicidal preparations for controlling weeds in cotton. The herbicides were applied, before emergence, in 30-cm.-wide bands down the row. Results in 1955 indicated that CMU gave effective control of *Amaranthus quitensis* and *Portulaca oleracea*, the recommended dose being 800 g. active principle per ha. CMU was more effective, and had greater residual action, than DOC. Results in 1956 confirmed this. None of the preparations tested was harmful to the germination and growth of cotton.—E.B.O.

1170 Ju-shen, H. and Tsing-hai, C. **Effect of various seed treatments on the control of cotton seedling diseases.** *Acta phytopath. Sinica* 1956, **2**, No. 2, 115–21, bibl. 6. [Agric. Coll., Nanking, China]

Hot-water treatment for 30 min. at 55–60°C. or at 74°C. effectively controlled seedling diseases of cotton. Ceresan 0·5% or granosan 0·2% reduced the incidence of disease by 37–78%. Seedling disease was reduced by 50% when seeds were treated with a culture of *Actinomyces*. F. Eng. s.—D.B.

1171 Bhide, V. P. and others. **Control of seedborne infection of anthracnose of cotton in Bombay State.** *Indian Cott. Gr. Rev.* 1957, **11**, No. 4, 496–8. [Coll. Agric., Poona 5]

In pot-culture tests at Poona, in 1955–6, for evaluating the efficacy of mercurial and copper seed-disinfectants for control of seedborne infection of cotton anthracnose (*Colletotrichum indicum*), organic mercurial seed disinfectants containing 1% of the active ingredient gave excellent control when applied at a level of 2 oz. per 15 lb. of cotton seed. This dose of the organic mercurial fungicide was tried on a field scale in 1956–7 in 3 compact blocks, each about 1,000 ac., in Nasik, East Khandesh and West Khandesh districts which together grow about one million acres of Virnar cotton. The treatment gave good control of seedling infection by anthracnose. The cost of treatment works out at about Re. 0·25 per ac. F.s.—D.B.

1172 Sauer, H. F. G. and Lepage, H. S. O novo sistêmico RP-7175 no combate ao pulgão do algodoeiro. [**The new systemic insecticide RP-7175 for controlling aphids on cotton.**] *Biológico, S. Paulo* 1958, **24**, No. 1, 1–6, bibl. 6.

In a plot trial using the cotton variety Campinas, RP-7175 (endothion) 20% emulsion applied as a spray at the rates of 250 and 500 cu. cm. active principle per "alqueire paulista" [= 24,200 sq. m.] was compared with metasystox and OMPA. All these preparations controlled effectively *Aphis gossypii*.—E.B.O.

1173 Galichet, P. F. Cinq années d'expérimentation en vue du contrôle des Diplopodes en culture cotonnière. [**Five years' trials to control Diplopoda in cotton cultivation.**] *Cot. et Fibr. trop.* 1957, **12**, No. 2, 266–82, bibl. 31, illus.

An account is given of laboratory and field trials carried out at Tikem Station, Chad, in 1951–6 to study the control of millipedes (Diplopoda) in cotton cultivation. In field trials, there was little difference between soil treatment and seed treatment; either was effective, as shown by emergence which was 7–10% higher, on average, in the treated than in the untreated plots. The following recommendations are made: (a) for soil treatment, HCH should be applied at the rate of 20–25 kg. of active substance per ha., or aldrin at 6 kg. of active substance per ha., 15 days before sowing; (b) for seed treatment, HCH should be used at the rate of 2–3 g. of active substance per kg. of undelinted seed, or aldrin at the rate of 0·5 g. of active substance per kg. of seed.—E.B.O.

1174 Souza, M. F. de and others. O contrôle de algumas pragas iniciais do algodoeiro por meio do tratamento das sementes com novos tipos de inseticidas sistêmicos. [**The control of some pests of cotton by treating the seed with new types of systemic insecticides.**] *Biológico, S. Paulo* 1957, **23**, No. 12, 227–36, bibl. 2.

In a plot trial in São Paulo, Brazil, with the cotton variety I.A.C. 817, several insecticides, used in mixture with the seed, were tested for controlling *Aphis gossypii*, *Tetranychus telarius* and *Hemitarsonemus latus*. Results showed that: (a) thimet, 45% active principle, in activated carbon, mixed with the seed in the proportion of 4%, gave effective control (95%) of *A. gossypii* for 60 days, falling to 58% after 70 days; OMPA was slightly superior; (b) disyston, 50% active principle, mixed with the seed in the proportion of 4%, gave 90% control of *A. gossypii* for 70 days; its control was still satisfactory after 100 days; (c) disyston, and OMPA to a lesser degree, gave satisfactory control of *T. telarius*; (d) no control was obtained of *H. latus*.—E.B.O.

1175 Kuei, M. H. and Tsui, C. **The effect of copper on the growth and drought resistance of cotton seedlings.** [Chinese] *Acta bot. sin.* 1957, **6**, No. 1, 73–9, bibl. 7, illus., English summary. [Dep. Biol., Shan-si Norm. Coll., China]

In northern China the germination percentage and the early growth of cotton are usually poor because of drought. The object of the investigation

described was to study the effect of copper on the growth of, and the water relationship in, cotton seedlings. The seeds of 3 cotton varieties, treated with different concentrations of copper sulphate, were sown in either the greenhouse or the field. Results showed that the growth of shoots and roots of the treated seeds was much better than that of the controls and that transpiration, water-holding force and suction force of the cotyledons were also increased by treatment. There was indication that higher concentrations of copper sulphate are required in the field than in the greenhouse, and that varieties react differently.—E.B.O.

1176 MILLER, C. S. and HALL, W. C. **Amino triazole salts and amino triazole-5-C^{14} studies on pigment production in cotton.** *Weeds* 1957, **5**, No. 4, 304–15, bibl. 11, illus. [Texas A. and M. Coll., College Sta.]

1177 PANDYA, P. S. and KULKARNI, Y. S. **Observations on boll shedding in some strains of Khandesh cottons.** *Indian Cott. Gr. Rev.* 1957, **11**, No. 4, 456–9, bibl. 4.

The cotton grown in Khandesh tract (*Gossypium arboreum* var. *neglectum* forma *bengalensis*) flowers from early September to early November with its greatest flowering intensity from 25 Sept. to 15 Oct. ; this corresponds with the period of heavy rains (2–3 in. per day) from the return monsoon. The resulting cloudy skies and saturation of the soil are factors which cause physiological boll shedding. With the object of overcoming this loss, 4 strains were studied, daily records being made of flower production and boll shedding, including bolls shed per fruiting branch. Most success was obtained with the strain NR5 which has its intensive flowering period between 3 Oct. and 7 Nov.—D.B.

1178 NEIRINCKX, L. Le diagnostic chimique et son application possible au cotonnier dans son aire congolaise septentrionale. [**Chemical diagnosis and its possible application to cotton in the north of the Belgian Congo.**] *Bull. agric. Congo belge* 1958, **49**, No. 1, 51–70, Flemish summary. [Sta. Rech. Agron. de l'INÉAC, Bambesa]

The method of chemical (foliar) diagnosis is examined and compared with other methods for determining the fertilizer requirements of crops. Some of its practical applications, particularly with groundnuts, are described. A scheme is presented for the possible application of this method to cotton in northern Congo.—E.B.O.

1179 WALTON, P. D. **Cotton agronomy trials in the Northern and Eastern Provinces of Uganda : 1925-56.** *Emp. Cott. Gr. Rev.* 1958, **35**, No. 1, 2–8, bibl. 3. [Emp. Cott. Gr. Corp., Serere, Uganda]

In date-of-sowing trials, the use of isolated and contiguous plots was compared. Results indicated that in the contiguous-plots experiments there was no danger of a build-up of pests and diseases occurring on the 1st planting, thus subjecting subsequent plantings to a higher infestation than normal, with a consequent reduction in their yields. Actually, late sowings yielded rather better in contiguous-plots experiments than in isolated-plots experiments. Data from contiguous-plots experiments in certain districts of the Northern and Eastern Provinces demonstrate a linear relationship between sowing date and yield. Plant populations had a small effect on yield over the range studied. The importance of considering row spacings as well as plant population has also been demonstrated. F.S.—M.P.

1180 DELATTRE, R. Rapport de mission au Soudan (ex Soudan Anglo-Egyptien) 15 Octobre – 15 Décembre 1954. [**Report of a mission to the Sudan (formerly the Anglo-Egyptian Sudan) 15 Oct. – 15 Dec., 1954.**] *Cot. et Fibr. trop.* 1956, **11**, No. 1, 58–86, No. 2, 153–84, and **12**, No. 2, 208–65, illus.

The object of this mission to the Sudan was to collect information on irrigated cotton there, in particular, its cultivation, agronomic research, and pest control (applied on a large scale in Gezira), and to compare results obtained in that country with those obtained under similar conditions in the French territories.—E.B.O.

FIBRE FLAX

See also Abs. 1326

1181 STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR, DENMARK. Forsøg med såmaengde og raekkeafstand i spindhør 1952–1955. [**Trials with different sowing rates and row spacing for fibre flax, 1952-5.**] *Medd. 558 Stat. Forsøgsvirk. Plantekult.* [Contained in] *Tidsskr. Planteavl* 1957, **61**, No. 3.

See Abs. 303.—P.J.B.

1182 HARTMANN, F. Einfluss der Aussaatzeit auf Ertrag und Qualität des Flachses in höheren Lagen. [**Influence of time-of-sowing on yield and quality of flax in elevated situations.**] *Bodenkultur* 1957, **9**, No. 4, 389–402. [Leinzuchtstation Kerschbaum des Österreichischen Faserforschungsinstitut]

In trials conducted at an altitude of 713 m. the experimental sowing dates lay between 23 April and 15 July. Taking into consideration the yields of seed and straw, resistance to lodging, growing period to maturity, fibre properties and seed properties, and the economics of cultivation, the most favourable sowing time for this location lies between 20 May and 10 June and should be as near to the earlier date as the late frosts permit.—D.B.

1183 Pontoppidan, H. Spindhørudbyttets afhængighed af forsommernedbøren. [**The dependence of fibre flax on early summer rainfall.**] *Lin* 1957, **11**, No. 5, 53–7. [Taastrup Hørskætteri, Denmark]

Studies were made of the relationship between the yield of raw and scutched fibre and seed, and the rainfall during May and June during 1946–55 at Taastrup, Denmark. Yields of all three components increased progressively during the trial period, a fact attributed to better cultivation techniques and to changing the variety from Concurrent to Wiera. The average yield of scutched fibre during the 3 years when rainfall during May + June was least (62–65 mm.) was 40% below the average for the entire trial period. In the 2 years when rainfall during May + June was greatest (125 and 160 mm., respectively), scutched-fibre yields were 43 and 42% above the mean. There was an appreciable increase in the long-fibre content of the raw fibre with increasing rainfall. The optimum rainfall during May + June was about 130 mm. for crude-fibre-, and about 150 mm. for scutched-fibre-yields. Seed yields were much less dependent on early-summer rainfall than were fibre yields. Drought in early summer was very deleterious to fibre quality.—P.J.B.

1184 Börner, H. and Rademacher, B. Experimentelle Untersuchungen zum Problem der Selbstverträglichkeit der höheren Pflanzen. [**Investigations on the problem of self-tolerance of higher plants.**] *Naturwissenschaften* 1957, **44**, No. 8, 498–9, bibl. 5. [Inst. PflSchutz der Landw. Hochschule, Stuttgart/Hohenheim]

Repeated cropping of flax or rye on the same land has shown the former to be self-intolerant and the latter self-tolerant. In these investigations the growth of flax and rye grown in water cultures previously used for the same plant species was compared with that of the control plants grown in a fresh solution. The dry-weight yields of shoot and root, shoot-length and number of flowers were all significantly lower, with the exception of shoot length in rye, in the experimental plants than in the controls, particularly in flax. The results indicated that self-intolerant plants (flax) exerted a greater inhibition than self-tolerant plants (rye) on the growth of plants of the same species succeeding them in a rotation.—M.P.

1185 Statens Forsøgsvirksomhed i Plantekultur, Denmark. Forsøg med sorter af spindhør 1955–1956. Foreløbig meddelelse. [**Trials with varieties of fibre flax, 1955–6. Preliminary report.**] *Medd. 577 Stat. Forsøgsvirk. Plantekult.* 1957, pp. 2.

The results are given of 8 trials at 4 locations in Denmark. Best yields of scutched fibre were given by Wiera, with 883 kg./ha., followed by Noblesse with 783 kg., Solido 770 kg., Diana 768 kg., Svalöf Kristina 690 kg. and Concurrent 640 kg. Data are given of other agronomic characters, together with brief notes on each variety. [See also *Fld Crop Abstr.* 10 : 247.]—P.J.B.

1186 Petersen, E. J. and Petersen, H. I. Forsøg med kemisk bekæmpelse af ukrudt i spindhør og oliehør. [**Trials on chemical weed control in fibre flax and oil-seed flax.**] *Tidsskr. Planteavl* 1957, **61**, No. 3, 408–44, bibl. 17, English summary.

In trials with fibre flax at a number of locations in Denmark during 1948–9, comparisons were made between the effect on fibre yields of : (a) 30 kg. $CuSO_4$, (b) 25% NaDNC at 5 kg., (c) 2,4-D Na salt and (d) MCPA Na salt, both at 0·5 kg./ha. in 1000 l. spray, applied to fibre flax 4–8 cm. high. Scutched fibre yields of untreated controls averaged 639 kg./ha., compared with 637, 670, 509 and 644 kg./ha. for treatments (a), (b), (c) and (d), respectively. MCPA and 2,4-D gave best weed control. 2,4-D was not regarded as suitable for use on fibre flax. In trials in 1949–51, 0·5 kg. MCPA Na salt, 3·5 l. of 20% dinoseb and mixtures of 2·5 l. dinoseb + 0·125 kg. MCPA/ha., or 1·7 l. dinoseb + 0·25 kg. MCPA/ha. were used. The use of mixtures resulted in considerably better scutched-fibre yields than either component used alone, or no treatment. The mixture of 1·7 l. dinoseb + 0·25 kg. MCPA was preferred and it was considered inadvisable to use dinoseb in air temperatures over 20°C., or in strong sunshine. In trials during 1950–4, the following were used : (a) 30 kg. $CuSO_4$, (b) 5 kg. 25% NaDNC, (c) 0·5 kg. MCPA and (d) 2·5 kg. 25% NaDNC + 0·25 kg. MCPA/ha. Scutched-fibre yields of controls and where treatments (a), (b), (c) and (d) were used averaged 490, 484, 498, 478, and 504 kg./ha. Weed percentages (expressed as percentages of the total green weight of crops sampled at flowering) were reduced to about half by treatments (b), (c) and (d). In trials in 1950–4, comparisons were made between the fibre yields of treated crops where weed percentages were either below (average 10%), or above (average 30%) 20%. In all cases where percentages were above 20, treatments increased scutched-fibre yields, especially in the case of MCPA + DNC ; where percentages were below 10, all treatments reduced yields, especially MCPA (10% yield reduction). Fibre quality was not greatly affected by treatment. Data are given on the effect of treatment with 0·5 kg. MCPA Na salt/ha., made to fibre flax at : (a) the cotyledon stage, (b) 4–5 cm. high, (c) 8–10 cm. high, (d) 12–15 cm. high, where weed percentages were either above (30%), or below (12%) the 20% level. Where weed percentages were over 20, treatment at stages (a), (b), (c) and (d) resulted in average scutched-fibre yields of 540, 594, 575 and 545 kg./ha., respectively, compared with 528 kg./ha. for controls ; where weed percentages were below 20,

yields were 637, 676, 651 and 610 kg./ha. and 704 kg./ha. for controls. Best fibre yields and weed control were secured by treatment at stage (b), though it was concluded from the overall data that it was best to spray when the crop was 4–7 cm. high. In trials with oil-seed flax, during 1950–4, the following treatments were made to crops 4–8 cm. high, with weed percentages of over 60, 40 to 60 and below 40 : (a) 30 kg. $CuSO_4$, (b) 5 kg. of 25% NaDNC, (c) 0·5 kg. MCPA Na salt and (d) 2·5 kg. 25% NaDNC + 0·25 kg. MCPA/ha. In trials with crops containing over 60% weeds, the seed yields of controls and where treatments (a), (b), (c) and (d) were used, averaged 603, 832, 981, 948 and 1003 kg./ha., respectively ; where weed percentages were 40 – 60, respective yields were 965, 1132, 1192, 1231 and 1232 kg./ha., and for crops with under 40% weeds, 1337, 1369, 1537, 1417 and 1467 kg./ha. The results showed that mixtures of DNC + MCPA gave the highest seed yields and best weed control, though either component used alone was almost as effective ; $CuSO_4$ was relatively less effective. In trials during 1949–54 to determine the best time to apply MCPA to oil-seed flax, the same growth stages were used as those for fibre flax. The results showed that it was safe to use MCPA when the crop was 4 – 7 cm. high.—P.J.B.

1187 Friederich, J. C. Voorlopige resultaten van de proeven betreffende toepassing van een 5-tal typen van herbiciden in vezelvlas in 1956. **Preliminary results of weed-control experiments with 5 kinds of herbicides in fibre flax in 1956.** *Meded. LandbHogesch., Gent* 1957, **22**, No. 3, 632–44, bibl. 32, illus., English summary.

The most favourable stage for applying herbicides to fibre flax was when the crop was 2–6 in. tall. Compounds containing MCPA and NaDNC, either separately or in combination, gave the best results. MCPB did not suppress annual weeds sufficiently. F.s.—R.B.

JUTE

1188 Chow, H. S. and Chi, C. Y. **Studies on the method of transplanting jute in paddy field in the summer fallow time before the harvesting of first crop of rice.** *Bull. Taiwan Agric. Res. Inst.* 1956, No. 17, 1–42, English summary pp. 39–42. [Taiwan Agric. Res. Inst., Taipei ; and Cotton and Jute Exp. Sta., Tainan]

Two methods of sowing and two of transplanting jute as an intercrop between 2 rice crops are given. The method most adapted to the conditions in central Taiwan is the planting of jute between the rows of rice before harvesting the rice. Using this method the following results were obtained from cultivation experiments. Because of the shade given by the rice plants, 20 – 30 days after germination is the best stage for transplanting jute seedlings. The best time for harvesting interplanted jute is late July to early August. Late harvesting gives a better yield of fibre but reduces the yield of the succeeding rice crop. The best spacing is 48 × 10·5 cm., the space between every other rice row being planted to jute. Chemical fertilizers are best applied after harvesting the first rice crop and again 2 weeks later. An early application of fertilizer decreases yield. Huwei-Green No. 7 is the most suitable jute variety for growing as an intercrop with rice. Late transplanting (after the first part of August) of the second rice crop reduces its yield. F. Eng. s.—D.B.

1189 Indian Central Jute Committee, Calcutta. **Annual Report of the Jute Agricultural Research Institute (1955–6).** [n.d.], pp. 143. [Received Dec. 1957]

1. Viability of seeds collected at different stages of maturity, p. 22. Seed of *Corchorus capsularis* varieties collected when the capsules were half-mature showed higher percentage germination than seed of *C. olitorius* collected at the same stage. The results showed that, with a slight loss in fibre yield, dual-purpose harvesting is possible, the plants being harvested for fibre before the seeds have matured. The seeds are allowed to ripen in the laboratory.

2. Flowering and seed formation in different varieties, pp. 22–4. Results throw light on : (a) the correlation of vegetative and reproductive phases in different varieties of *C. capsularis* and *C. olitorius* ; (b) variations in the rate of fibre production in relation to other growth components during these 2 phases ; (c) inheritance of earliness and lateness in flowering.

3. Salt tolerance, pp. 25–6. When the NaCl content of the soil was 1–2% at sowing time, seeds of varieties of *C. capsularis* were 80% viable but of *C. olitorius* only 50%. The latter produced stunted plants ; the former grew to average size (3 ft.) and produced fibre of good quality and seed which was 80–90% viable. A pre-sowing seed treatment with NaCl solutions slightly increased salt tolerance.

4. The new stripped-bark weight method (pp. 26–7) has been developed for estimating fibre content of individual plants in the field without resorting to retting. The percentage of fibre in different varieties has been worked out in relation to green- and dry-weights and weights of bark and xylem tissue.

5. Manuring trials, pp. 29–37. There was a significant increase in yields when N (as ammonium sulphate) was applied at 20 lb. per ac. Heavier applications were not justified. When different N fertilizers at 30 lb. N/ac. were compared, ammonium sulphate gave significantly higher fibre yields than chile saltpetre and urea.

6. Line sowing, pp. 37–9. In *C. capsularis*, line sowing was superior to the traditional broadcast

sowing. 12 in. between rows with 3 in. between plants gave a 26% increase in fibre yield compared with broadcasting.

7. Retting, pp. 50–2. In laboratory experiments, the retting period was shorter when *Crotalaria juncea* with or without bone dust was added to the retting jute than when ammonium sulphate and bone dust were added. Of complex salts added to the retting water the best results were obtained with potassium persulphate at 1 ppm. The optimum temperature for retting was 34–35°C.

8. Pest control, pp. 60–70. Attacks by *Nupserha bicolor* ssp. *postbrunnea*, a new pest on *C. olitorius* but not on *C. capsularis*, can be reduced by line sowing instead of broadcasting.—D.B.

HIBISCUS SPP.

1190 SANYAL, P. and others. **Seed rate of *Hibiscus sabdariffa* L.** *Indian J. agric. Sci.* 1957, **27**, No. 2, 163–70, bibl. 5. [Res. Inst., Barrackpore, West Bengal]

Since recommended seed rates of *H. sabdariffa* range between 8 and 60 lb. per ac., optimum seed rate was investigated in a randomized and replicated experiment. Eight seed rates, at 5-lb. intervals from 5 to 40 lb. per ac. (broadcast) were tested for their influence on fibre yield, plant height, basal diameter and plant population. The lower the seed rate, the stronger was plant growth. As seed rate increased, plant height, basal diameter and fibre yield per plant decreased and plant mortality increased. The optimal stand of 148,452 plants [per acre] and the highest fibre yield per acre were obtained with 10 lb. seed per ac.—D.B.

1191 INDIAN CENTRAL JUTE COMMITTEE, CALCUTTA. **Annual Report of the Jute Agricultural Research Institute (1955–6)**, [n.d.], pp. 143. [Received December, 1957]

Sowing date, p. 76. With *Hibiscus sabdariffa* var. *altissima* the highest fibre yields were obtained when sown in mid-April and with *H. cannabinus* when sown in the last week of April. Seed rate, pp. 76–7. With *H. cannabinus*, maximum fibre yield was obtained with 10 lb. seed per ac.—D.B.

OIL CROPS

SESAME

See also Abs. 1337

1192 MAZZANI, B. El ajonjolí en Venezuela. [**Sesame in Venezuela.**] *Bibl. Cult. rur. 5 Minist. Agric. y Cría, Venezuela* 1957, pp. 77, bibl. 11, illus.

The first part of this booklet gives general information on *Sesamum indicum*, including its origin, description and varietal characteristics. The second part deals with its cultivation in Venezuela where it occupies an area of over 20,000 ha. Tables show seed yields and characteristics of the seed and the plant, from different spacings. [See also Abs. 308, 309, 311, 312 and 749.]—E.B.O.

1193 CASTRO, C. C. and others. El ajonjolí. Algunas informaciones para su cultivo. [**Sesame. Some information on growing it.**] *Agric. trop., Bogotá* 1958, **14**, No. 1, 9–20, bibl. 5.

In the cotton region of Colombia, conditions are suitable for sesame which can be grown profitably in rotation with cotton. The information given on sesame includes its history, plant characteristics, varieties, cultivation, pest control and oil content of the seed.—E.B.O.

1194 CHAKRAVARTI, S. C. and ARORA, B. K. **Experimental induction of leaf heteromorphism in *Sesamum indicum* L.** *Curr. Sci.* 1958, **27**, No. 1, 32, bibl. 1, illus. [Govt Hamidia Coll., Bhopal, Central India]

The heteromorphism was induced by removing both of the cotyledonary leaves or the shoot apex soon after germination and was therefore accompanied by a reduced supply of carbohydrates. The abnormalities consisted of narrowing of the leaf lamina in the apical half of the leaf or the production of oblong instead of ovate leaves; the leaf margins were smooth instead of serrated. —D.B.

OIL-SEED FLAX

1195 STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR, DENMARK. Forsøg med sorter af oliehør 1953–57. [**Varietal trials with oil-seed flax 1953–7.**] *Medd. 589 Stat. Forsøgsvirk. Plantekult.* 1958, pp. 2.

In 19 trials at 4 locations in Denmark during 1953–7, yields of Øtofte L 4/47 and Trifolium Rekord averaged 16·7 and 15·9 hkg. seed and 643 and 593 kg. crude oil/ha., respectively. In 16 trials during 1954–7, Pastel yielded an average of 16·9 hkg. seed and 668 kg. crude oil/ha. In 8 trials during 1956–7, Dæhnfeldt New Elite yielded 16·8 hkg. seed and 660 kg. crude oil/ha. Brief notes are given on each variety. [See also Abs. 750.]—P.J.B.

1196 STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR, DENMARK. Ukrudtsbekaempelse i oliehør med kemiske midler. [**Weed control in oil-seed flax with chemicals.**] *Medd. 559 Stat. Forsøgsvirk. Plantekult.* [Contained in] *Tidsskr. Planteavl* 1957, **61**, No. 3, 553–4.

1197 ROBINSON, R. G. [Summarizer] [**Weed control in flax (linseed).**] [4 abstracts] *Res. Rep. 14th N. Cent. Weed Contr. Conf.* [USA] 1957, 94–5.

From the results of trials in Manitoba, it was

concluded that where both grass and broad-leaved weeds were present effective control could be secured by post-emergence applications of 3–5 lb. TCA + 6 oz. a.e. of MCPA ester/ac. Where broad-leaved weeds, only, were present, 4–6 oz. a.e. of MCPA ester, or 8–12 oz. MCPB/ac., applied to linseed 2 in. high, was effective. In trials in Manitoba and Saskatchewan to compare the effect of different rates and spray volumes on damage caused to linseed by MCPA and 2,4-D, spray volumes of 10–15 gal./ac., were less injurious than 2·5–5 gal./ac. when applied in combination with rates of 6–10 oz. a.e. of herbicide/ac. In trials in Minnesota, post-emergence treatment with 1 lb. dalapon, or 5 lb. TCA/ac., made when the linseed was 3 in. high and *Setaria faberi* 1 in. high, gave excellent control of *S. faberi*, with no injury to the linseed ; similar results were obtained with *S. viridis* and *S. lutescens*.—P.J.B.

1198 Comstock, V. E. and Culbertson, J. O. **A rapid method of determining the oil content of the seed and iodine values of the oil from small samples of flaxseed.** *Agron. J.* 1958, **50**, No. 2, 113–14, illus.

1199 De Fina, A. L. Instrucciones para observar un ensayo ecológico de linos oleaginosos. [**Instructions for observing an ecological trial with linseed.**] *Vol. 27 Cult. industr. Fac. Agron. Univ. La Plata, Argentina* 1957, pp. 10.

Rules are given for recording observations on the phenology, agronomy, pests, diseases and yields of linseed. Forms for recording these observations are shown.—E.B.O.

SUNFLOWER

See also Abs. 1212, 1229

1200 Candussio, R. Equilibri di concimazione per una coltura di girasole in terreno ferrettizzato. [**Balanced manuring for a sunflower crop on red loam.**] *Ann. Sper. agr.* 1958, **12**, No. 1, 139–67, English summary. [Sta. Chim.-agr. Sper., Udine, Italy]

In a field trial in Friuli, Italy, the application of NK (the best manuring combination tested) increased sunflower seed yields significantly, while P had no effect. Data are given on the effect of fertilizers on : the weight of 1000 achenes, the unit yield of oil, the unit yield of total dry-matter, the ratios between the various parts of the plant, and the mineral composition of whole plants and achenes.—E.B.O.

CRAMBE SPP.

1201 Minister of Agriculture, Canada. **New plants for possible oil production in Canada.** *Rep. Minist. Agric. Canada 1956–7*, 1957, 90.

Of several oil-producing plants tested for adaptation to Canadian conditions and compared with flax, *Crambe* (spp.) was of greatest interest. The seed produces over 36% oil which has a low iodine number, and a very high erucic-acid content.—D.B.

SARSON

1202 Dharampal Singh and Singh, D. N. **Improved varieties of yellow sarson in Uttar Pradesh.** *Indian Oilseeds J.* 1957, **1**, No. 5, 330–4.

An account is given of the origin, distinguishing features and yields of 3 improved (and now selected) varieties of yellow sarson [*Brassica campestris* var.]. The outstanding features of the varieties are as follows. Type 1 gives a high yield (an average of 26% above the local variety) and has a high oil-content ; its height (5 ft.) and its sturdy, branching habit make it suitable for mixed cropping with gram [*Cicer arietinum*] or peas ; seeds are small with 210 seeds/g. Type 10 matures a week earlier than types 1 or 151 ; its yield is, on an average, 20% above the local variety ; it gives higher yields than type 1 on light soils and under low rainfall. Type 151 yields 22% above the local variety ; its height (5 ft.) and the fact that its branches begin high on the plant, make it suitable for mixed cropping with wheat. With 180 seeds/g. this is the largest-seeded variety. It is recommended for western districts.—D.B.

GENERAL

1203 Statistical News Letter. **Sample surveys on oilseed crops.** *Statist. News Lett.* 1957, **6**, No. 4, 11.

State-wide surveys were carried out during 1954–5 to estimate the yield per acre of linseed, rape-mustard, and sesame, using a stratified, 3-stage, random-sampling technique, the 3 stages being village, field, plot. Stratification increased the efficiency of the survey. The results revealed the desirability of distributing the experiments over a larger number of villages with fewer fields within each. The plot size of 0·0125 ac. which is generally adopted for food crops was suitable for oilseeds also.—D.B.

CROP BOTANY

PHYSIOLOGY

See also Abs. 1102

1204† Friedberg, L. Détermination et conservation de la faculté germinative des graines (quelques problèmes de physiologie). [**Determination and conservation of germinating capacity in seeds (some problems of physiology).**] *J. Agric. trop. et Bot. appl.* 1957, **4,** No. 7–8, 303–14, bibl. 9, illus. [Establ. L. Clause, Brétigny-sur-Orge, France]

The subject is reviewed and discussed.—E.B.O.

1205† Vereščagin, A. G. [**Metabolism of reserve oils in plants.**] [Russian] *Usp. Sovrem. Biol.* (*Adv. mod. Biol., Moscow*) 1958, **45,** No. 1, 114–29, bibl. 146.

The subject is reviewed from the following aspects : peculiarities of oil formation in plants ; oil metabolism in germinating seeds ; oil formation in ripening seeds ; the role of mineral elements and certain vitamins in the metabolism of fats ; and the mechanism of the formation of fatty acids in plants.—M.H.

1206† Čaĭlahjan, M. H. [**Physiology of plant growth and development in the USSR during 40 years (1917–1957).**] [Russian] *Izv. Akad. Nauk, SSSR* (*Bull. Acad. Sci., USSR*) *Biol. Ser.* 1958, No. 1, 59–70, bibl. 48. [Timirjazev Inst. Pl. Physiol., Acad. Sci. USSR]

The subject is reviewed under the sections : plant growth and tropisms ; and the reproductive development of plants. [See also *Herb. Rev.* 5, pp. 83–7 ; 7, pp. 27–35, 94–9, 181–91, 265–74, and *Herb. Abstr.* 19, Abs. 1155, 1156.]—M.H.

1207† Pettersson, M. L. R. and others. **An inherent character of plant species of drier habitats.** *Nature, Lond.* 1957, **180,** No. 4588, 698–9, bibl. 6. [Acton Tech. Coll., London]

Data are presented which support the contention that among green plants it is normal for a genotype of moister modal habitat to have inherently wetter, more dilate (dilation = fresh wt/dry wt ratio) tissues than a similar related genotype of drier modal habitat. The value of dilation estimations in tests of drought resistance in plants is indicated.—M.H.

GROWTH AND REPRODUCTION

1208 Sarin, M. N. and Rao, I. M. **Effect of sodium sulphate on early seedling growth of gram and wheat.** *Agra Univ. J. Res.* (*Sci.*) 1956, **5,** No. 1, 143–53, bibl. 12, illus.

The influence of different concentrations (0·2, 0·4, 0·6 and 0·8%) of Na_2SO_4 was studied on seedling growth of gram (*Cicer arietinum*) and on wheat. Root length under each treatment was recorded after 48, 72 and 96 hr. Up to 48 hr after sowing, root growth was more adversely affected in gram than in wheat. After 96 hr., root lengths of gram and wheat were, respectively, in 0·2% solution 64 and 90%, and in 0·8% solution 34 and 90% of controls. Growth of plumule was also adversely affected in gram more than in wheat.—D.B.

1209 Elgabaly, M. M. and Abdel Ghani, A. M. **Specific effects of adsorbed ions on plant growth.** *Soil Sci.* 1958, **85,** No. 3, 161–6, bibl. 7, illus. [Univ. Alexandria, Egypt]

1210† Bauman, L. Über die Beziehungen zwischen Hydratur und Ertrag. [**On the relationships between soil moisture and yield.**] *Ber. dtsch. bot. Ges.* 1957, **70,** No. 2, 67–78, bibl. 13, illus. [Exp. Fm Servs, Vauxhall, Alberta, Canada]

Results of osmotic studies on a range of field- and fodder-crops grown under irrigation indicated that their growth and yields were dependent on the water content of the plants and this in turn was influenced by the moisture status of the soil. The necessity for maintaining the soil at a moisture content optimum for maximum crop yields and for irrigating whenever the plants required water was demonstrated.—M.P.

1211 Förster, Rita. Über den Einfluss von Gerbstoffen auf Keimung und Wachstum von höheren Pflanzen. [**On the influence of tannins on the germination and yield of higher plants.**] *Beitr. biol. Pfl.* 1957, **33,** No. 2, 279–311, bibl. 25, illus. [Bot. Inst. Potsdam-Sanssouci]

The investigation was carried out to assess the importance, to plant growth, of naturally occurring tannins in soil, originating from leaf mould, fungal and other sources. Germination of *Sinapis alba* was adversely affected by tannic acid (0·5–5%) and gallic acid (0·2–1%) ; that of maize and peas was unaffected, wheat was intermediate in reaction. The lower the germination temperature, the greater the inhibition by the tannins. The effect of tannins on the root growth of these plants and others (including rye, oats and barley) was also studied and was found to vary with the species.—M.P.

1212 Stolwijk, J. A. J. and Thimann, K. V. **On the uptake of carbon dioxide and bicarbonate by roots, and its influence on growth.** *Pl. Physiol.* 1957, **32,** No. 6, 513–20, bibl. 20, illus. [Biol. Lab., Harvard Univ., Cambridge, Mass.]

The growth of roots of intact plants of *Pisum sativum, Vicia faba,* and *Helianthus annuus* was com-

pletely inhibited if the root medium was aerated with air containing 6·5% CO_2. Oats and barley were unaffected by such treatment. Peas showed a small but consistent stimulation of root growth when the root atmosphere contained 0·5% CO_2, but were inhibited at levels as low as 1·5%. A specific toxic effect seemed to be indicated. CO_2-uptake by roots of peas and barley was of the order of only a few percent of the amount produced by respiration in short-term experiments and ceased after *c.* 8 hr. Translocation of the products into the shoots of the intact plants was about 3 times as great in the light as in the dark. It is concluded that carbonate fertilization of crops is unlikely to be beneficial, and that the CO_2 content of some soils may already be supra-optimal. F.s.—M.P.

1213 Kurnik, E. A napi megvilágítási idötartam jelentösége a növények honosításában. [**The significance of the photoperiod in plant acclimatization.**] *Kisérl. Közl.* 1956, **50,** No. 1, 57–79, bibl. 21, illus., German and English summaries. [Received Dec., 1957] [S.-E. Transdanubian Agric. Exp. Inst., Iregszemese, Hungary]

From a study of the change in the length of the developmental phases in certain crops (including sunflower, soyabean, groundnut, beet and flax) an almost constant ratio was found, under the experimental conditions, between duration of the phases and the amount of light and warmth available at different latitudes. There is evidence that : (1) when there is an increase in the length of exposure to light with each degree rise in latitude, seed production is augmented, oil- and fibre-contents of the crops concerned increase while protein content diminishes ; and (2) short-day crops (up to a certain temperature limit) may yield substantially larger harvests at latitudes higher than normal. F.s.—M.H.

GROWTH SUBSTANCES

1214 Libbert, E. and Lübke, Hildegaard. Physiologische Wirkungen des Scopoletins. 1. Mitteilung. Der Einfluss des Scopoletins auf die Samenkeimung. [**Physiological effects of scopoletin. 1. The effect of scopoletin on seed germination.**] *Flora, Jena* 1957, **145,** No. 1/2, 256–63, bibl. 25. [Humboldt Univ., Berlin]

The germination of 1-yr.-old seeds of *Sinapis alba* was unaffected by scopoletin at any concentration, whereas the germination of 3-yr.-old seeds was significantly increased by scopoletin at a concentration as low as 10^{-11} g./ml. When scopoletin and IAA were applied together the scopoletin enhanced the inhibition of germination brought about by IAA.—M.P.

1215 Humphreys, T. E. and Dugger, W. M. **The effect of 2,4-dichlorophenoxyacetic acid on the respiration of etiolated pea seedlings.** *Pl. Physiol.* 1957, **32,** No. 6, 530–6, bibl. 18. [Dep. Bot., Agric. Exp. Sta., Univ. Florida, Gainesville]

The respiration of etiolated pea seedlings declined rapidly after removal of the cotyledons. 2,4-D-treated seedlings were able to maintain a higher rate of respiration during this period of decline than were untreated seedlings. From the data presented, it is postulated that 2,4-D increases respiration by causing more glucose to be catabolised via the pentose phosphate pathway. F.s.—M.P.

1216† Salisbury, F. B. **Growth regulators and flowering. 1. Survey methods.** *Pl. Physiol.* 1957, **32,** No. 6, 600–8, bibl. 39. [Bot. and Pl. Path. Dep., Colorado State Univ., Fort Collins]

Plants of *Xanthium pennsylvanicum* were treated with a series of growth regulators just before being induced to flower by a single 16-hr. dark period. Dalapon, MH, 2,4-D, 2,4-dinitrophenol and cobaltous ion inhibited flowering at concentrations which also caused a general inhibition of vegetative growth or caused other toxic responses. IAA and NAA inhibited flowering at concentrations which had no visible effects on the plant. Growth regulators were applied at different times in relation to the single inductive dark period. Dalapon, MH and 2,4-D inhibited flowering regardless of when applied. IAA and NAA inhibited flowering only when applied before maximum concentration of flowering hormone had been built up outside the leaf (as shown by defoliation experiments). 2,4-dinitrophenol inhibited flowering only when applied during the inductive dark period, and cobaltous ion only when applied during the first 8 to 10 hr. of the inductive dark period. Growth regulators were applied just before plants were induced to flower with varying lengths of a single dark period. All 7 compounds inhibited flowering at all night lengths, but only cobaltous ion changed the minimum period of darkness required to cause the first perceptible signs of flowering (it increased the length of the critical dark period by as much as 3 hr.). On the basis of these data it is suggested that MH, dalapon and 2,4-D inhibit the development of the floral bud. IAA, NAA and low concentrations of 2,4-D may cause a destruction of flowering hormone in the leaf in either light or darkness. 2,4-dinitrophenol inhibits synthesis of flowering hormone whereas cobaltous ion interferes with the mechanism controlling the critical night length. Results with 2,4-D indicate that its auxin effects might be separable from its herbicidal effects. Results with 2,4-dinitrophenol show that the herbicidal effects of this compound on cocklebur depend upon a period of darkness following application of the chemical, although floral bud development is independent of this response. F.s. —M.P.

1217 Lona, F. and Bocchi, Ada. Sviluppo vegetativo e riproduttivo di alcune longidiurne in rapporto all'azione dell'acido gibberellico. [**Vegetative and reproductive development of some long-day plants in relation to the effect of gibberellic acid.**] *Nuovo G. bot. ital.* 1956, **63,** No. 4, 469–86, bibl. 7, illus., English summary. [Ist. Bot., Univ. Parma, Italy]

Ten young plants (5–6 leaves) of *Papaver somniferum*, which had already been subjected to long-day conditions in the field, were potted and then kept under short-day conditions. Five of these plants, treated with gibberellic acid (3 drops per day of an aqueous solution 10^{-4} [g./l.] placed on the apex) for 20 days, elongated their flower stem and flowered 15 days before the untreated controls.—E.B.O.

1218 Gorter, C. J. **Abscission as a bioassay for the determination of plant growth regulators.** *Physiol. Plant.* 1957, **10,** No. 5, 858–68, bibl. 20, illus. [Lab. voor Tuinbouwplantenteelt, Landbouwhogeschool, Wageningen, Netherlands]

1219† Virtanen, A. I. and others. **Antimicrobial substances in cereals and fodder plants.** *Arch. Biochem.* 1957, **69,** 486–500, bibl. 10, illus. [Biochem. Inst., Univ. Helsinki, Finland]

A substance with strong anti-fungal activity towards *Fusarium nivale* and *Sclerotinia trifoliorum*, and identified as 2(3)-benzoxazolinone, has been extracted from the sap of rye seedlings. 6-methoxy-2(3)-benzoxazolinone, also with anti-fungal properties, has been isolated from young wheat and maize plants. Similar substances have been isolated from lucerne and red clover and other plants. In the *Phytophthora infestans*-resistant potato variety Aquila, chlorogenic acid was found in so high a concentration in the leaves that it inhibited late-blight. F.s.—M.P.

NUTRITION

See also Abs. 949

1220† Krzysch, G. Blattdüngung mit Mineralsalzen. [**Foliar spraying with mineral salts.**] *Z. PflErnähr. Düng.* 1958, **80,** No. 1, 42–55, bibl. 98.

This is a literature review.—D.B.

1221† Schachtschabel, P. Magnesium in Boden und Pflanze. [**Magnesium in soil and plant.**] *Z. landw. Versuchs- u. Untersuchwes.* 1956, **2,** No. 6, 507–23, bibl. 20, English and Russian summaries. [Inst. Bodenkunde, Tech. Hochschule, Hannover] [Received March, 1958]

Mg-deficiency symptoms in potatoes, beets and legumes are described, together with a method for determining the Mg content of the soil and plants. Measures to counteract Mg deficiency are discussed.—M.P.

1222 Henkens, C. H. Koper op bouwland. [**Copper in arable land.**] *Landb Voorl.* 1957, **14,** No. 11, 581–9, bibl. 4, illus. [Inst. Soil Fertility, Groningen]

Reduced yield can occur as a consequence of a lack of copper in the soil without any deficiency symptoms being shown. Humus content and pH of the soil have apparently an influence upon the degree of copper deficiency, and liming increases it. Under heavy applications of N the plant requires more copper.—G.M.R.

1223† Kramer, P. J. **Relative amounts of mineral absorption through various regions of roots.** *U.S. Atomic Energy Comm. Rep. TID 7512, Conf. Radioact. Isot. in Agric.* 1956, 287–95, bibl. 37, illus. [Duke Univ., Durham, N. Carolina] [Received March, 1958]

Recent studies in which radioactive isotopes were supplied to limited regions of roots indicated that much less translocation of ions to the shoot occurred from the root tip than from a region several cm. behind the tip. In herbaceous plants it was probable that most minerals entered through the root hair zone. Passive as well as active transport of minerals to the stele occurred. Increased water absorption appeared to increase passive mineral absorption. Accumulation of ions in root cells was only part of the process of mineral absorption. Most of the upward translocation of absorbed ions probably occurred without the ions having traversed the cell vacuoles. F.s.—R.B.

TECHNIQUES AND APPARATUS

1224 Lakon, G. and Bulat, Helene. Die Feststellung der Keimfähigkeit der Leguminosensamen nach dem Topographischen Tetrazolium-Verfahren. [**Determination of the germination capacity of legume seeds by the topographic tetrazolium method.**] *Saatgut-Wirtsch.* 1957, **9,** Nos. 10, 11 and 12, pp. 267–70, 295–8, 325–7 ; 1958, No. 1, 11–14, bibl. 13.

The technique for carrying out the topographic tetrazolium test is described and the germination capacity obtained by germination tests and by the topographic tetrazolium method is tabulated for the following species (amongst others) : *Vicia faba, V. sativa, Lupinus albus, L. luteus, L. angustifolius.*—D.B.

1225† Schuurman, J. J. and Knot, L. Het schatten van hoeveelheden wortels in voor wortelonderzoek genomen monsters. **The estimation of amounts of roots in samples taken for root investigation.** *Versl. Landb-Kundig Onderz.* 1957, No. 63·14, pp. 31, bibl. 5, illus., English summary. [Instituut voor Bodemvruchtbaarheid, Groningen]

An attempt was made to correlate the weights of roots in the top layer of the soil with those in the

subsoil ; the correlation was not sufficient to enable top-layer sampling to be dispensed with. The comparison of washed root samples with a standard series of root samples of known weights gave accurate results, but the gain in sampling speed was limited. A direct method for estimating amounts of roots in soil samples was evolved, in which sample soil-borings were sectioned at different levels and the root distribution was compared with a standard series of distribution diagrams. These diagrams consisted of circular figures of diameter comparable with that of the soil sample. On each a series of dots was drawn, whose diameter was approximately that of a root cross-section. The area covered by the dots in each figure was calculated ; it ranged from 0·02% to 40%. The original diagrams were constructed 5 times the size of the soil samples and were then scaled down by means of photography. Specimen diagrams and graphs correlating percentage area with dry weight are given. F.S.—R.B.

1226† Jensen, G. **Application of the tonometer principle for root respiration measurements.** *Physiol. Plant.* 1957, **10,** No. 5, 967–83, bibl. 60, illus. [Pl. Physiol. Lab., Roy. Vet. and Agric. Coll., Copenhagen, Denmark]

The respective characteristics of : (a) open systems with constant gas concentrations, and (b) closed systems with variable gas concentrations, are reviewed briefly. The method described is suitable for studying the respiration of the root systems of intact plants and uses the closed-system principle, in which the roots are held in a sealed chamber filled with nutrient solution, which is circulated in a system containing a tonometer. The tonometer contains an air bubble and an equilibrium is established between the gases in the air bubble and those in the nutrient solution circulating past it. The air bubble is periodically removed and analysed for O_2 and CO_2. The results are given of experiments on root respiration in young maize plants. The mean error of the method was calculated to be 3·5% for CO_2 and 1·9% for O_2.—P.J.B.

1227† Cooper, G. R. and others. **A totalizing light meter for biological research.** *Maine Fm Res.* 1958, **5,** No. 4, 7–9, illus.

The construction, calibration and operation of a totalizing light-meter is outlined. The instrument was not designed for extreme accuracy but rather for reasonable accuracy at a reasonable cost. —M.P.

1228† Langer, R. H. M. and Canaway, R. J. **An automatic device for the control of day length.** *J. hort. Sci.* 1958, **33,** No. 1, 58–61, bibl. 3. [Grassl. Res. Inst., Hurley, Berks]

1229 Lucena, C. F. and Aragonés, A. R. La lana de vidrio como soporte de cultivo en el estudio sobre deficiencias de boro en plantas. [**Glass wool as a culture support in the study of boron deficiency in plants.**] *An. Edafol. Fisiol. veg.* 1957, **16,** No. 11, 1099–110, bibl. 7, illus.

In studying the symptoms of B deficiency in plants by means of nutrient solutions, it was found that 5 plant species, including *Helianthus annuus* and *Zea mays*, which require a B content of 0·1–1 ppm. in the culture medium, showed clear symptoms of B deficiency when glass wool was used as a support. This is explained by the low solubility of glass wool and its low content of total B. Glass wool can, therefore, be used as support in these studies.—E.B.O.

1230† Hutton, R. G. and Nye, P. H. **The rapid determination of the major nutrient elements in plants.** *J. Sci. Fd Agric.* 1958, **9,** No. 1, 7–13, bibl. 22. [Univ. Coll. Ghana, Achimota]

A rapid method has been developed in which N, P, K, Ca, Na and Mg are determined in a single solution, obtained by digesting plant material with sulphuric acid and Se. The analysis can be conducted with an error not exceeding 5%. F.S.—M.P.

1231 Scharrer, V. K. and others. Vergleichende Untersuchungen über die Bestimmung von Mikronährstoffen mittels photometrischer und spectrochemischer Verfahren. [**Comparisons in the quantitative determination of micronutrients by means of photometric and spectrochemical methods.**] *Z. PflErnähr. Düng.* 1957, **79,** No. 2, 102–7, bibl. 10. [Univ. Giessen, W. Germany]

A new spectrochemical method, by which the macroelements are first separated out by Na-pyrrolidin-dithiocarbamate, gives quantitative determinations of micronutrients which are almost as reliable as those obtained by the photometric method. The spectrochemical method has the advantage that several elements can be determined at one analysis whereas the photometric method requires a separate analysis for each element. Results are tabulated giving the micronutrient content of maize, beans [*Vicia faba*], white- and red-clover.—D.B.

RADIOBIOLOGY

1232† Pasinetti, A. and Giori, C. **New method for the determination of radioactivity in vegetal and animal tissues.** *Experientia* 1957, **13,** No. 5, 415–6, bibl. 1, Italian summary. [Univ. Milan, Italy]

A preliminary note is given on the use of a modified Langsdorf chamber for the detection of radioactivity in biological tissues. The method is claimed to be very sensitive and to be able to indicate radioactivity of very low energy.—M.P.

1233† Bryant, F. J. and others. **Radiostrontium in soil, grass, milk and bone in the United Kingdom : 1956 results.** *Atomic Energy Res. Est., Harwell Publ. HP/R 2353* 1957, pp. 24, bibl. 27. [A.E.R.E., Harwell]

The results of ^{90}Sr analysis of soil, grass and sheep bone from 12 stations in England and Wales are given. The ^{90}Sr in the top 4 in. of undisturbed soil in July, 1956 ranged from 1·9 to 10·0 mc./km.^{2}, depending on the rainfall. The ^{90}Sr activity of herbage and of sheep bone showed a wider range, samples from acid hill soils being relatively more active. F.s.—c.l.s.

1234 Süss, A. Aufnahme und Verteilung von radioaktivem Calcium (Ca^{45}) bei einigen Kulturpflanzen. [**Intake and distribution of radioactive calcium (^{45}Ca) by some crop plants.**] *Bayer. landw. Jarhrb.* 1957, **34**, No. 5, 617–21, bibl. 4, illus. [Bayer. Landesanst. für PflBau und PflSchutz, München, W. Germany]

The uptake by barley, potatoes and sugar-beet of radioactive calcium from $^{45}CaCO_3$ which was present in the soil was investigated. After 21 days, ^{45}Ca was distributed throughout the whole of the plant but was present to a greater degree in the vascular than in other plant tissues. The rate of movement of ^{45}Ca in the potato plant was 21 mm./day, which is much slower than the movement of radioactive P. ^{45}Ca spread more rapidly throughout the plant when applied as $^{45}Ca\ Cl_2$ solution. —d.b.

1235† United States Department of Agriculture. **Defense against radioactive fall-out on the farm.** *Fmrs' Bull. 2107 U.S. Dep. Agric.* 1957, pp. 15, illus.

This publication is intended for farmers and gives practical information on the nature of radioactive fall-out and what to do in the event of contamination of stock, land and crops.—p.j.b.

1236† OEEC. **Applications of atomic science in agriculture and food.** *Project 396 OEEC* 1958, pp. 113, bibl. 9, illus.

This is a report of a mission to the USA, in March-June, 1957, to obtain information on the applications of atomic science to research in relation to : soils and plants ; radiation biology ; crop preservation. The institutions visited and the lectures attended are listed. This report is designed especially for those who are not well acquainted with the use of atomic science in agriculture and wish to know in a simplified way how and where it can be used in their own research programmes.—e.b.o.

1237† Bilquez, A. F. Développement de l'emploi des radiations ionisantes dans les recherches relatives à l'agriculture. [**Development in the use of ionizing radiations in agricultural research.**] *J. Agric. trop. et Bot. appl.* 1957, **4**, No. 9–10, 446–52, bibl. 23.

The subject is reviewed and discussed.—e.b.o.

MISCELLANEOUS

1238 Nilsson, P. E. **Influence of crop on biological activities in soil.** *K. Lantbr-Högsk. Ann.* 1957, **23**, 175–218, bibl. 100, illus. [Inst. Microbiology]

The significance for plant production of microbial activity in the rhizospheres of crop plants is discussed. A method of investigation is described, and the number of micro-organisms belonging to the different main groups of the rhizosphere populations has been determined for the crops studied (oats, barley, peas) and in corresponding uncropped soils. F.s.—g.m.r.

1239† Obolensky, G. Diverses actions des ultrasons en biologie. [**Different effects of ultrasonics in biology.**] *Année biol.* 1957, **33**, No. 11–12, 465–521, bibl. 267. [Physiol. Vég., Fac. Sci., Paris]

This review of the literature includes the effects of ultrasonics on plants, in particular on : cells, seeds, germination, root growth, seedling growth, flowering, maturation and yield. A general discussion on the subject, and a table summarizing the data, are also given.—e.b.o.

1240† International Commission for the Nomenclature of Cultivated Plants. I.U.B.S. **International Code of Nomenclature for Cultivated Plants. 1958,** pp. 28, 24 × 16 cm., Utrecht, Netherlands: International Association for Plant Taxonomy.

The code consists of a series of 55 Articles (rules) governing the naming of cultivated varieties, to be known as cultivars. These Articles are concerned with : the definition and scope of the term cultivar ; botanical categories and their designation ; the formation and use of cultivar names (including rules on inadmissible names) ; publication, priority and rejection of cultivar names ; translations, transliterations and commercial synonyms ; collective names of cultivars of hybrid origin ; registration of names ; trademarks ; and future modification of the Code. Appendixes give recommendations for the guidance of registration authorities and a list of international registration authorities. The articles of the Code will take effect from 1 January 1959.—d.b.

1241† Juhrén, Marcella and others. **The standardization of *Poa annua* as an indicator of smog concentrations. 1. Effects of temperature, photoperiod, and light intensity during growth of the test-plants.** *Pl. Physiol.* 1957, **32**, No. 6, 576–86, bibl. 16, illus.

[Earhart Pl. Res. Lab., Calif. Inst. Technol., Pasadena]

P. annua was grown under controlled conditions in 8 temperature combinations, natural and artificial light of various intensities, and 3 photoperiods. It was also grown in the air-pollution greenhouse in which the day temperature rose gradually to a maximum lasting about 2 hr. Growth rates, fresh- and dry-weights were obtained. The environmental conditions under which *P. annua* was grown strongly affected its sensitivity to smog. Smog sensitivity was tested by exposing the plants to atmospheric smog for 1 day in test-boxes in which air flow and humidity were regulated. Three days after the exposure, the length of the 3 youngest leaves and of the bands of damage on them was measured and damage expressed as % per blade per plant. Test plants of satisfactory sensitivity were obtained by growing the seedlings at a day temperature of 26°C. and 20°C. night in the Earhart Laboratory, or the equivalent in daily heat-sum in the air-pollution greenhouse, combined with a 16-hr. photoperiod and natural light. Temperatures of 30°C. day and 24°C. night, or their equivalent heat-sum, produced plants which were resistant to smog; intermediate temperatures produced plants of intermediate sensitivity. There was an interaction of light intensity with temperature. Partial explanation for the differing sensitivities of plants grown in different conditions was afforded by the evidence that the stomata had a different habit of opening in each condition. Sensitivity developed at the age of 10 days, even before the 2nd blade had grown out, in plants in hot conditions; but thereafter diminished. At 4 weeks, damage in heavy smog was less than 5% per blade per plant. Sensitivity in plants grown in cool conditions did not develop until about the 3-leaf stage, but did not diminish until the plants were more than 6 wk. old. Plants grown in hot conditions increased in sensitivity when transferred to cool conditions. Those grown in cool conditions lost sensitivity when changed to hot ones. An appreciable gain or loss in sensitivity to smog required about 3 days. Smog sensitivity was not correlated with plant size, nor with growth rate. It was strongly correlated with the area over which the stomata were wholly or partly open. It was also correlated with oxidant levels. F.S.—M.P.

WEEDS AND WEED CONTROL

Where weeds are specific to a crop, see under the crop concerned.

See also Abs. 1327, 1328, 1329, 1353

1242 Wiancko, M. R. [Summarizer] [**Control of**] **Couch grass.** [8 abstracts] *Res. Rep. Nat. Weed Cttee, E. Sect.* [*Canada*] 1957, 79–82.

In trials at Kentville, Nova Scotia, an old sward, infested with *Agropyron repens*, was treated either in late Sept., 1956, or early May, 1957, with dalapon, amino triazole and mixtures of equal parts of dalapon + amino triazole in 50 gal. water/ac. Two weeks after the spring treatment, all plots were ploughed and sown with a number of crops, including sweet-corn, peas and potatoes. Spring treatment with dalapon (at rates of 5 – 40 lb./ac.) reduced *A. repens* to a trace, while autumn treatments had no effect. Amino triazole was less effective in all cases than dalapon; mixtures of dalapon + amino triazole were no more effective than dalapon, alone. No crop showed evidence of herbicidal injury, nor was there any significant effect on yields of potatoes or peas, the only crops harvested.—P.J.B.

1243 Buchholtz, K. P. [Summarizer] [**Control of**] **Quackgrass.** [13 abstracts] *Res. Rep. 14th N. Cent. Weed Contr. Conf.* [*USA*] 1957, 35–44.

In trials in Wisconsin, dalapon, 2,3,5,6-TBA and 2,3,6-TBA were applied at rates of 4 lb./ac. and simazin at 8 lb./ac. on 10 or 25 April or 2 May to an old *Agropyron repens* sward. The treatment on 10 April was made to bare, recently burned-over ground. On 20 May, the area was sown with maize. Treatment with simazin on 10 April gave substantially better control of *A. repens* than the other treatments and markedly increased maize grain yields over controls. In trials in Alberta, 3 applications of dalapon at 3 lb./ac. at monthly intervals were as effective for controlling *A. repens* as 3 lb./ac. applied 7 times at 10-day intervals. In further trials to compare dalapon and amino triazole, applications were made in mid-June when the *A. repens* was 8–10 in. high and follow-up treatments when the regrowth was 4 in. high. No treatment gave complete control. Dalapon was about twice as effective as amino triazole. Nearly compete eradication of *A. repens* was secured by spring treatment with 12 lb. dalapon/ac., followed by re-treatment at 6 lb./ac., with tillage delayed for 4 weeks after the initial treatment. In studies in Wisconsin, 2,3,6-TBA was more effective as a soil treatment than where applied to the foliage.—P.J.B.

1244 Phillips, W. M. [Summarizer] [**Control of**] **Field bindweed.** [5 abstracts] *Res. Rep. 14th N. Cent. Weed Contr. Conf.* [*USA*] 1957, 7–9.

In trials in Kansas on the use of soil sterilants for controlling *Convolvulus arvensis*, mixtures of monuron + borates, or monuron + sodium chlorate + borates were equal to sodium chlorate in effectiveness, provided that their rates of applica-

tion were increased slightly. In trials in Nebraska, sodium chlorate was slightly more effective than the mixtures. Excellent control of bindweed followed the use of 2,3,6-trichlorobenzoic acid and polychlorinated benzoic acids. Ext.—P.J.B.

1245† Bondarenko, D. D. **3-amino-1,2,4-triazole as an herbicide on Canada thistle (*Cirsium arvense* (L.) Scop.) and its effect on soil microörganisms.** *Diss. Abstr.* 1957, **17**, No. 10, 2109–10. [Ohio State Univ., Columbus]

Treatment of initial spring growth of *Cirsium arvense* with amino triazole [rate not stated] gave excellent results regardless of the stage of growth when treated ; in 1955 plants in the vegetative stage only were controlled. Treatment in May 1956 reduced the stand by 93–96%, whether ploughed 5, 10 or 15 days later, or not ploughed. Treatment of regrowth was highly satisfactory when delayed until the thistles were 4–30 in. tall. Amino triazole applied at night was just as effective as a daytime application. A good rate for satisfactory control was 4 lb. a.i. in 80 gal. water/ac. Amino triazole mixed with 2,4-D or monuron was no more toxic to *C. arvense* than amino triazole alone. The pH of the amino triazole solution did not influence its toxicity. Soil micro-organisms were not affected.—R.B.

1246 Kinch, R. C. and Termunde, D. **Germination of perennial sow thistle and Canada thistle at various stages of maturity.** *Proc. Ass. off. Seed Anal. N. Amer.* 1957, **47**, 165–6. [S. Dakota, State Coll., Brookings]

Heads of perennial sow thistle [*Sonchus arvensis*] and Canada thistle [*Cirsium arvense*] were harvested at daily intervals from 2 days after the flowers opened until the mature seed was being released. The seeds were graded according to age at harvesting, and allowed to germinate on nitrate-moistened blotting paper and then kept, alternately, for 2 weeks between 20 and 30°C. in daylight and for 2 weeks at 5°C., over a period of 3 months, in order to break dormancy. *S. arvensis* produced viable seed 4 days after the opening of the flowers and mature seed 9 days after opening. *C. arvense* produced viable seed 6 days, and mature seed 9 days, after opening, though seed was not normally dispersed until after 11 days.—R.B.

1247 Willard, C. J. [Summarizer] [**Control of**] **Canada thistle and perennial sow thistle.** [9 abstracts] *Res. Rep. 14th N. Cent. Weed Contr. Conf.* [*USA*] 1957, 1–6.

The most effective treatments were high-volume spraying with amino triazole when growth was vigorous in spring ; *Cirsium arvense* was more susceptible than *Sonchus arvensis*. After mowing or cultivation of the first growth, treatment of regrowth in summer was effective. The use of wetting agents did not increase the effectiveness of amino triazole, nor did the addition of other herbicides. Ext.—P.J.B.

1248 Friesen, H. A. **"Randox" applied at various rates and methods of soil incorporation for the selective control of wild oats (*Avena fatua*).** *Res. Rep. 14th N. Cent. Weed Contr. Conf.* [*USA*] 1957, 77. [Exp. Fm, Lacombe, Alberta, Canada]

In trials in Alberta, CDAA was applied at rates of 2,4, or 8 lb./ac. on 9 May to barley stubble infested with wild oats. After these treatments, the area was rototilled, disced, or left untilled. Barley and linseed were sown immediately after cultivation, and, in the case of barley, 1 and 2 weeks later. The wild oats had just started to germinate when treated. CDAA at 8 lb./ac. gave very good control of wild oats, irrespective of tillage treatment. The stands of barley sown at the 1st and 2nd dates were reduced, but grain yields were unaffected. Barley sown at the 3rd date did not suffer stand reduction. Best yields and stands of linseed followed treatment at 8 lb./ac.—P.J.B.

1249 Dunham, R. S. [Summarizer] [**Control of**] **Annual and winter annual grass weeds.** [42 abstracts] *Res. Rep. 14th N. Cent. Weed Contr. Conf.* [*USA*] 1957, 45–64.

The results are reported of extensive trials, mostly in Canada, on the control of wild oats, particularly with EPTC, which, in most cases, gave excellent results when used at rates ranging from 2 to 15 lb./ac. The crops most resistant to EPTC included flax and field peas, while wheat and barley were very susceptible to injury. Results with CDAA were variable and suggested that this herbicide works best under warm conditions. Trials with 1,2,4,5-tetrachlorobenzene gave variable results against wild oats. Results with IPC and CIPC at 3–4 lb./ac. were excellent. In trials on cultural methods for controlling wild oats, delayed sowing of barley was the most effective, but severely reduced grain yields. EPTC effectively controlled *Setaria* sp. in 3 trials in Canada and 1 in Minnesota. In 2 other trials in Minnesota EPTC was effective for a short time only. In Canadian trials, excellent control of *Setaria* sp. followed the use of 0·25 lb. dalapon, or 1 lb. TCA/ac. In trials on cultural practices for controlling *Setaria* sp. in Manitoba, harrowing once before emergence of wheat and once after emergence, but before the crop was 2 in. high, gave the best results. In trials in Texas on the control of volunteer sorghum, plants 6 in. high were best controlled by 6 lb. MH in 40 gal. water/ac. ; the addition of a wetting agent significantly reduced its effectiveness. Ext.—P.J.B.

1250† Lebrun, J. La position actuelle du problème de l'*Eichhornia crassipes* en Afrique au sud du Sahara. [**The present position of the**

problem of *E. crassipes* in Africa south of the Sahara.] *Bull. agric. Congo belge* 1958, **49**, No. 1, 247–54.

This is a progress report published by CCTA/CSA in 1957, based on information obtained from various African countries. It deals with the present extent of infestation by the water hyacinth, with control measures, and with problems still to be solved.—E.B.O.

1251† Coleman, P. G. **The chemical control of water hyacinth in Kelantan.** *Malay. agric. J.* 1957, **40**, No. 3, 200–8, bibl. 3, illus.

In trials to control water hyacinth (*Eichhornia crassipes*) the preparation used was trioxone (2,4-D plus 2,4,5-T containing 6 lb. of acid equivalent per gal.) which was applied from boats in channels, 2 treatments being given. One gal. of concentrate in 80 gal. of spray should be applied per ac. The operation was successful in clearing the channels but constant patrols must be kept to prevent re-infestation from escaped plants.—E.B.O.

1252† Amaral, J. K. and others. Principais invasoras dos campos de pastagem e lavouras do Rio Grande do Sul. [**Principal weeds of pastures and crops in Rio Grande do Sul (Brazil).**] *Lavour. arroz.* 1957, **11**, No. 132, 22–25.

Lists are given of weeds (scientific and local names) of wheat, maize, rice, flax and potato. Resistance, or susceptibility, of the weed species to 2,4-D treatment is also shown.—E.B.O.

1253† Vayssière, P. Les mauvaises herbes en Indo-Malaisie. [**Weeds in Indo-Malaya.**] *J. Agric. trop. et Bot. appl.* 1957, **4**, No. 9–10, 392–401, bibl. 6, illus.

Information is given on *Eupatorium odoratum*, *Imperata cylindrica* and *Gleichenia linearis*, particularly their control.—E.B.O.

1254 Narayanan, T. R. and Meenakshisundaram, D. **Studies on the relative efficacies of a few chemical herbicides in the control of *Spergula arvensis*, L. and *Oxalis latifolia* HB & K., two important weeds of the Nilgiris.** *Madras agric. J.* 1958, **45**, No. 1, 1–6, bibl. 10. [Agric. Coll. and Res. Inst., Coimbatore]

Extar A at 8 lb. and triherbide NIX at 20 lb./ac. (in a spray volume of 100 gal./ac.) were the best herbicides for controlling *S. arvensis*. They acted rapidly, killing over 90% *S. arvensis* plants within a week of application. Spraying before flowering is recommended. For controlling *O. latifolia*, the butyl ester of 2,4-D at 5 lb./ac. and triherbide NIX at 20 lb./ac. were the most effective herbicides for killing the aerial parts but did not suppress regrowth from underground organs. For this, 2,4-D Na or MCPA, each at 5 lb./ac. were the most successful herbicides.—D.B.

1255 Fletchall, O. H. [Summarizer] [**Control of**] **Johnsongrass and Bermudagrass.** [5 abstracts] *Res. Rep. 14th N. Cent. Weed Contr. Conf.* [*USA*] 1957, 32–4.

In trials in Kansas to compare different spray volumes as carriers for dalapon at 15 or 20 lb./ac., or erbon at 0·5 lb./sq. rod applied to *Sorghum halepense*, volumes of 20, 40 and 80 gal./ac. were used. All treatments gave at least 95% control of *S. halepense*, though 80-gal. spray-vol. gave the most rapid kill. Follow-up treatments in autumn gave complete control. In trials in Kentucky, regrowth of *S. halepense*, after a third mowing in one season, was treated with dalapon at 3·7 lb./ac., MH at 3 lb./ac., or amino triazole at 2 lb./ac. 3 times at one-week intervals. One week after the final treatment, the area was disced 3 times before sowing winter wheat. The dalapon treatments resulted in 95% control, during the following July. The amino triazole and MH treatments were much less effective.—P.J.B.

1256† Meadly, G. R. W. **Weeds of Western Australia. Stinkwort (*Inula graveolens* Desf.).** *J. Dep. Agric. W. Aust.*, 1958, **7**, No. 1, 33–5, illus.

Heavy grazing or mowing during early stages of growth gives some control. Stinkwort is not highly susceptible to hormone-like herbicides, but can be controlled by spraying with 2,4-D ester at 1–2 lb. a.e. in 6–10 gal. water/ac.—A.M.H.

1257 Parsons, W. T. **Blackberry, a widely distributed noxious weed.** *J. Dep. Agric. Vict.*, 1958, **56**, No. 3, 169–78, illus.

Blackberry (*Rubus fruticosus* and *R. laciniatus*) can now be satisfactorily controlled by 2,4,5-T (ester) applied during December to March for 2 or 3 successive summers.—A.M.H.

1258 Healy, A. J. **Mediterranean mustard [*Brassica tournefortii*], a new and potentially troublesome weed in New Zealand.** *N.Z.J. Agric.* 1958, **96**, No. 2, 111–13, bibl. 5, illus. [Dep. Sci. Ind. Res., Christchurch, N.Z.]

1259 Friesen, H. A. [Summarizer] [**Control of**] **Toadflax and other perennial herbaceous weeds.** [21 abstracts] *Res. Rep. 14th N. Cent. Weed Contr. Conf.* [*USA*] 1957, 18–31.

The results are presented of trials with soil sterilants and other herbicides for the control of *Linaria vulgaris*. In trials in Alberta on the control of *Equisetum arvense*, amino triazole at 5 lb./ac. gave almost complete control during the year after treatment. Treatment with 4 oz. a.e. of MCPA butyl ester, amine or Na salt/ac. gave 70% control. Notes are also given on the control of *Artemisia absinthum*, *Helianthus ciliaris*, *Silene vulgaris* and *Gonolobus laevis*.—P.J.B.

1260 Loomis, W. E. [Summarizer] **Basic studies**

[on weed control]. [15 abstracts] *Res. Rep. 14th N. Cent. Weed Contr. Conf.* [*USA*] 1957, 162–8.

In studies on the growth of rhizome buds of *Sorghum halepense*, maximum sprouting occurred in continuous darkness and increased as temperatures rose from 60 to 80°F. At given temperatures, sprouting decreased as photoperiod increased. The effect on sprouting of amino triazole, dalapon and MH at different concentrations was also investigated. In studies on the lateral spread and density of growth of *Cardaria draba*, *C. draba* var. *repens* and *C. pubescens* var. *elongata*, it was concluded that the heart-podded type (*C. draba*) was the most aggressive. In studies on seed maturation in *Sonchus arvensis*, seed heads were removed from plants from 2–11 days after they had opened. Seed from heads removed 5–6 days after opening was not viable ; seed from heads removed 7, 8, 9, 10 and 11 days after opening was 0·4, 3, 86, 83, 75% viable, respectively. In similar trials with *Cirsium arvense*, the seed from heads removed 6, 9, 10, 11, 12 and 19 days after opening was 0, 1·3, 12, 85, 91, and 78% viable, respectively. The results of some studies on the herbicidal effect of CDAA and IPC on wild oats, barley, linseed and peas are reported. In studies in Nebraska, determinations were made of the peroxidase and polyphenolase activity of bud extracts of *Euphorbia esula* and *Vernonia baldwini* at weekly intervals during May to Dec. In both species, dormancy was associated with low peroxidase activity ; polyphenolase activity was very low in *E. esula* and high in *V. baldwini* and was not apparently associated with dormancy. In phenological studies on bud dormancy in these species, it was shown that bud dormancy existed and resulted in poor emergence and weak growth during mid-July to mid-Dec. Dormancy was broken when soil temperatures fell to 32°F. Gibberellic acid appeared to stimulate, or activate, growth from dormant crown buds in *E. esula*, but foliage and soil treatment had no effect on the dormancy of *V. baldwini*. In studies in Kansas, *Kochia scoparia* was much more tolerant to drought than native grasses, or sorghum. Maximum root penetration of *K. scoparia* was about 10 ft. on an upland site and 16 ft. on an alluvial soil ; roots spread laterally up to 8 ft. in a scattered stand. In studies in Iowa on leaf surfaces, it was found that epidermal cells grow by accretion at the margins and that during cell growth, there are narrow zones with neither cuticle nor wax, just above the vertical side-walls of the cells. Bands of wax deposit were, however, laid down at the cell margins during cell maturation. It was thought that the relatively great susceptibility of growing plants to herbicides was due, in part, to herbicidal penetration of uncutinized growth zones of cells.—P.J.B.

1261 Sand, P. F. [Summarizer] **[Control of] Hoary cresses and bur ragweed.** [2 abstracts] *Res. Rep. 14th N. Cent. Weed Contr. Conf.* [*USA*] 1957, 10–11.

In trials in Nebraska on the control of bur ragweed (*Franseria tomentosa*) the following materials applied as soil treatments gave excellent control : sodium tetraborate at 15 lb./sq. rod, sodium chlorate at 5 and 7 lb./sq. rod, 7·5% 2,4-D + sodium borate at 5 and 7 lb./sq. rod, erbon at 120 and 160 lb./ac., 2,3,6-trichlorobenzoic acid at 40 and 60 lb./ac. and polychlorobenzoic acid at 20 and 40 lb./ac. In trials in Saskatchewan during 3 years, applications of 6 lb./ac. amino triazole, followed by 2 cultivations, or cultivation retreatment at 3 lb./ac. followed by a late cultivation in autumn, gave 99% kill of *Cardaria draba*. Complete kill could be secured by cropping the land during the following season.—P.J.B.

1262 Derscheid, L. A. **[Control of] Leafy spurge (*Euphorbia esula*) and Russian knapweed (*Centaurea repens*).** [12 abstracts] *Res. Rep. 14th N. Cent. Weed Contr. Conf.* [*USA*] 1957, 12–17.

1263 Kommedahl, T. [Summarizer] **[Control of] Annual, winter annual, and biennial broad-leaved weeds.** [20 abstracts] *Res. Rep. 14th N. Cent. Weed Contr. Conf.* [*USA*] 1957, 65–75.

In trials in Manitoba and Saskatchewan, neburon, at 1 lb./ac. was effective against *Polygonum convolvulus* in pure stands, or in wheat and oats. Adding 2,4-D ester to neburon also controlled *Chenopodium album* and *Salsola kali*. Also effective against *P. convolvulus* were 2,4-D isopropylamine salt, when applied as a split application at an early growth stage, and 2,3,6-TBA. Post-emergence treatment of *Fagopyrum tataricum* with neburon at 1–4 lb./ac. resulted in complete control, with no injury to barley or oats. Ext.—P.J.B.

1264 Justice, O. L. **Germination, dormancy, and viability in seeds of certain weedy species of *Cyperus*.** *Proc. Ass. off. Seed Anal. N. Amer.* 1957, **47**, 167–75, bibl. 8.

The germination response of seeds of 9 spp. of *Cyperus* stored dry at room temperature and moist at 4 low temperatures is given. Seeds of all spp. harvested soon after maturity were dormant for a period. Except for seeds of *C. iria*, dormancy was overcome more rapidly with moist storage at low temperatures than when dry at laboratory temperatures. Seeds of only one sp. (*C. ovularis*) failed to after-ripen at room temperature. As after-ripening of dormant seeds progressed, the germination requirements became less exacting. The time required for complete loss of viability of seeds stored dry at room temperature ranged from approximately 3 yr. for *C. polystachos* var. *texensis* to approximately 12 yr. for seeds of *C. iria*. F.S.—R.B.

1265 Jensen, L. A. and others. **Seed characteristics of certain wild barley, *Hordeum* spp.** *Proc. Ass. off. Seed Anal. N. Amer.* 1957, **47**, 87–93, bibl. 7, illus. [Oregon State Coll., Corvallis]

An illustrated key for the identification of the spikelets and florets of 8 wild spp. of *Hordeum* is given.—R.B.

1266 Warington, Katherine. **Changes in the weed flora on Broadbalk permanent wheat field during the period 1930-55.** *J. Ecol.* 1958, **46**, No. 1, 101–13, bibl. 8. [Rothamsted Exp. Sta., Harpenden, Herts]

Seasonal and cultural conditions seem more important than fallow in determining the quantity of weeds that occurs in any one year, the balance between the weeds and between the weeds and crop being affected by them. The reduction in annual species achieved by the intensive fallow of 1926–9 has on the whole been maintained, that of *Papaver rhoeas* being the outstanding example, though since 1953 there have been signs of the return of this weed. *Alopecurus myosuroides*, another principal weed, on the other hand has been only temporarily checked by the once-in-five-year fallow and has quickly re-established itself, though less noticeably so since 1953. This reduction in some species has been accompanied by a large increase in others, e.g. *Ranunculus arvensis*, *Vicia sativa* and *Avena* spp., the latter having been gradually eliminated by hand pulling. F.S.—M.H.

1267 Koch, F. Die Unkrautgemeinschaften der deutschen Dauerdüngungsversuche auf Ackerland. [**The weed associations of the German, long-term, manurial trials on arable land.**] *Bayer. landw. Jahrb.* 1957, **34**, No. 4, 403–57, bibl. 77, illus. [Landw. Hochsch., Stuttgart-Hohenheim, W. Germany]

In order to study the behaviour of weeds in the presence of different crop nutrients, botanical analyses were made, by Braun-Blanquet's scale of cover method, in 30 fields of arable crops which had undergone manurial treatment for at least 12–15 years. These treatments were carried out under the auspices of experiment stations in various parts of the Federal Republic. The manurial treatments were : N, P, K, Ca, FYM and control. From the results, tables were produced showing the weed species in descending order of their requirement for a given nutrient. It was found possible to select species which serve as indicators of sufficiency, or deficiency, of each of these nutrients.—D.B.

1268† Constable, D. H. **A new grass-killing mixture.** *Pest. Abstr.* (*C*) 1957, **3**, No. 4, 203–4, bibl. 1. [Rubber Res. Inst., Ceylon]

The application of a mixture of 2–4 lb. amizol + 2–4 gal. of 12% PCP in 40 gal. of solution per ac. was completely successful (in small-scale trials) against *Paspalum conjugatum*, *Briza minor*, *Ischaemum* spp. and other grasses, also *Cyperus vaginatus*. Burn appeared within 24 hr., was complete in 1 week and lasted 3 months. Subsequent regrowth was composed largely of species originally absent or dormant.—M.P.

1269 Dring, R. J. **A new weed killer.** *Agric. Merch.* 1958, **38**, No. 2, 75–7, 86, illus. [Fisons Pest Contr.]

A brief resumé is given of the properties and advantages of MCPA/TCB (formerly CP 18–15), a new herbicidal mixture which has been extensively tested over 2 seasons. It has the same non-poisonous properties as MCPA and MCPP. This herbicidal mixture [rates not given] controls all weeds susceptible to MCPA, 2,4-D or CMPP and in addition it controls mayweed [*Matricaria* spp.], redshank [*Polygonum persicaria*], coltsfoot [*Tussilago farfara*] and cleavers [*Galium aparine*]. It gives satisfactory results at temperatures below 45°F. ; it is best applied at low volumes. It is safe for use on all cereals from early-tillering to the 5-leaf stage. It must not, however, be used on undersown crops, or crops to be undersown to clovers.—M.P.

1270† Vidme, T. Kjemiske middel mot ugras. [**Chemical weed control.**] *Smaskr. 6/57 Landbruksdep. Opplysningstjeneste* 1957, pp. 27. [Statens Plantevern, Ugrasbiologisk Avdeling, Vollebekk, Norway]

Tables are given showing the principal herbicides in practical use, the best time of application, the quantities to employ and the herbicidal resistance of different weeds found in Norway. Notes are given on suitable herbicides for applying to specific crops and on the use of non-selective herbicides.—P.J.B.

1271 Upchurch, R. P. and Pierce, W. C. **The leaching of monuron from Lakeland sand soil. 1. The effect of amount, intensity and frequency of simulated rainfall.** *Weeds* 1957, **5**, No. 4, 321–30, bibl. 8. [U.S. Air Force Armament Centre, Elgin Air Force Base, Florida]

SURVEYS AND LAND USE

SURVEYS

1272† WITNEY, D. **A survey of agriculture in the East and South-east of Scotland.** *Bull. 53, Edinb. E. Scot. Coll. Agric.* 1957, pp. 58, illus.

After a description of the geographical, climatic and soil conditions in the 11 counties served by the College for research and advisory purposes, the agricultural practices of the area are discussed. A statistical appendix is attached and throughout the text comparisons are drawn between the productivity of other farming activities in the area and those obtaining in the remaining 80% of Scotland. A much greater percentage of the East of Scotland is under intensive use, although the percentages of rough grazing vary considerably between constituent counties. The area produces approximately 75% of the wheat, 66% of the barley, 50% of the potatoes and nearly all of the sugar-beet grown in Scotland. Modern rotational practices are described. Rotational grassland exceeds the area of permanent grass and the yields of the former surpass the national average. Cattle are the greatest earners of income, followed by potatoes, milk and sheep (plus wool). Comparisons are made with the rest of Scotland regarding the types of farming practised, the size of the farms, labour and wages. Land tenure, capital requirements, mechanization, marketing and agricultural progress in the region are described.—M.H.F.

1273 VALLE, O. Die Entwicklung des finnischen Pflanzenbaus nach dem zweiten Weltkrieg. [**Development of crop production in Finland after the second world war.**] *Maataloust. Aikakausk.* 1957, **29**, No. 3, 167–76. [Agric. Res. Cent., Tikkurila]

Although at the end of the war Finland was the poorer by 300 thousand hectares of arable land, new land has been brought under the plough so that by 1958 the arable area will equal that of 1939, namely, about 2·6 million ha. Post-war farming is more intensive, there is a greatly increased use of fertilizers and increasing mechanization (the number of tractors increased from 6000 to 53,000, the number of combine harvesters from 0 to 3000). Circumstances, mainly unfortunate weather conditions, in the '40s and '50s, have produced a great reduction in the rye-growing area and a smaller one in that of winter wheat, and the country is no longer nearly self-supporting in bread cereals as in 1938–9. The barley area, however, has increased by about 80% since 1950, and oats, mainly white oats, occupy an area as great as that of rye, wheat and barley together. Industrial crops are sugar-beet and winter rape. The increasing importance of Finnish-bred strains of cereals and other plants is noted. A reorganization of research at the beginning of 1957 has ensured closer co-operation between the research and advisory services.—G.M.R.

1274† DEVRED, R. and HARDY, R. Résultats et commentaires agronomiques d'une mission pédo-botanique au Kwango. [**Results from, and agronomical notes on, a pedological-botanical mission to the Kwango.**] *Bull. agric. Congo belge* 1957, **48**, No. 6, 1381–1424, bibl. 8, illus. [Div. Bot. INÉAC, Yangambi, Belgian Congo]

Information is given on studies to improve the Kwango (100,000 sq. km.), one of the poorest regions of the Belgian Congo, with notes on its vegetation and agriculture.—E.B.O.

1275 BERGE, M. and LAMOUROUX, M. Utilisation et conservation des sols de savane arborée du Moyen-Togo. [**Utilization and conservation of soils in tree savanna in the Middle Togo.**] *Comm. Conf. Intern. Afric. Ocid. CCTA/CSA 6th Sess. 2nd Vol.* 1956, 101–37, bibl. 11, illus., English, Spanish and Portuguese summaries. [Received Apr., 1958]

Information is given, for French Togoland, on climate, vegetation, soils, local cultivation methods, agricultural improvement and colonization.—E.B.O.

1276 JOHNSON, C. E. **African farming improvement in the Plateau Tonga maize areas of Northern Rhodesia.** *Agric. Bull. 11 Dep. Agric. N. Rhod.* 1956, pp. 62, 1 map, bibl. 26.

The Plateau Tonga area produces approximately 70% of African maize in the lower Kafue basin. Soil deterioration persists in spite of intensified conservational measures. Specialized maize production by a minority exists alongside the subsistence cultivations of the majority, but, as the latter change to stabilized commercial farming, the need for alternative methods for maintaining fertility becomes greater. The history of maize marketing, through a Control Board, is traced — the system of bonus payments has been changed from a bag to an acreage basis. From funds accumulated by the maize pool, water supplies have been developed, conservational practices extended, farm equipment subsidized and fertilizers distributed. The improved farmers number only 4% of the families but the monocultural practices encourage larger holdings than would a more intensive and diversified system of farming. Most maize growers are also cattle owners but their production of maize per acre is low compared with subsistence producers. These improved farms are, however, serving as demonstration units and, although

manure application is spreading and contour ridging is established, better crop husbandry is needed, nitrogen and phosphorus fertilizer applications need extension, more productive maize varieties need exploring, better planting methods, pest and weed control need emphasis and efforts should be made to introduce fodder crops instead of beans into the rotation. Steps are also needed to improve the drainage and to minimize the wastage of reaped grain. The uncultivated land is overstocked and a new system of stock management is necessary. Bush grazings must, by management, be converted to pasturage and stock numbers limited to the productivity of the herbage. Cultivated land is acquired by reclamation of bush. All cultivated land, between croppings, and all uncultivated land is subject to common pasturage but the available grazing is diminishing with the expansion of cultivation. The communal grazing system will persist for a long time, their boundaries should be stabilized. Restrictions on arable incursions should be introduced and cultivated land should be registered. The demarcated grazings would then be allocated to specific groups of people for a controlled number of stock. The adoption of a land-use plan is an urgent need for evolution from the shifting subsistency economy to a stabilized peasant-farming system and for the incorporation of animal with crop-husbandry practices.—M.H.F.

1277† Dozier, C. L. **Establishing a framework for development in Sardinia : the Campidano.** *Geogr. Rev.* 1957, **67,** No. 4, 490–506, illus. [Rollins Coll., Winter Park, Florida]

Topographical and other obstacles to the agricultural development of Sardinia are reviewed and a description is given of current projects to harness the waters of the Flumendosa River for irrigating the Campidano Plain.—P.J.B.

LAND USE

See also Abs. 1360

1278† Chew, H. C. **Changes in land use and stock over England and Wales 1939 to 1951.** *Geogr. J.* 1956, **122,** No. 4, 466–70, bibl. in text, maps. [Seen May, 1958]

1279† Wibberley, G. P. **Land planning and agriculture.** *J. Land Agents' Soc.* 1958, **57,** No. 3, 122–31, bibl. 10.

An analysis shows the main changes in land use in England and Wales since 1900. Since that date it is suggested that the loss of farm land to all other uses is of the order of 2·25 million acres and that, now, some 30,000 acres of agricultural land are being converted each year to urban uses. The effect of this on town planning and land improvement and reclamation is considered.—C.L.S.

1280 Cocking, W. P. and Lord, R. F. **The Tanganyika Agricultural Corporation's Farming Settlement Scheme.** *Trop. Agric., Trin.*, 1958, **35,** No. 2, 85–101, illus.

The history and organization of the scheme are briefly reviewed. At present nearly 100 Africans are farming over 2400 acres under the supervision of 2 European managers. Individual holdings range from 14 to 49 acres. A summary of a year's work on a holding is given. In general, machinery has been used only for work which is beyond the capacity of the farmer and if an adequate return is likely. The rate of turnover of farmers has been high, but over 20% have stayed for at least 3 yr. The need to meet the relatively high fixed charges levied means that labour must be spread over a wider range of crops than is usual in the area. Soyabeans have become of increasing importance and rosette-resistant groundnuts have increased the income potential. The finances both of farmers and of the scheme as a whole are discussed.—A.M.H.

1281 Guinard, A. and Gros, Y. Enquêtes agricoles dans le secteur pilote d'Azaourisse. [**Agricultural investigations in the pilot sector at Azaourisse.**] *Agron. trop., Nogent* 1957, **12,** No. 4, 474–91, map.

The programme for improving agriculture in the Oueme valley and delta, Dahomey, included the establishment of 3 pilot sectors. The object of these investigations was to study the agricultural system now in use in the sector at Azaourisse, an area of 1600 ha. in the lower delta. The good qualities and defects of this system are described. —E.B.O.

1282 Guinard, A. Le développement de la production agricole dans le delta de l'Ouémé. [**The development of agricultural production in the Oueme delta (Dahomey).**] *Agron. trop., Nogent* 1957, **12,** No. 4, 451–67, 1 map.

A programme is presented for improving agriculture in the Oueme valley and delta, a region periodically flooded and where there are more than 25,000 ha. suitable for cultivation.—E.B.O.

1283 Oberholzer, S. F. **An economic investigation of farming in two extensive cattle-farming regions of the Union of South Africa.** *Bull. 350 (Div. Econ. and Markets No. 46) Dep. Agric. S. Afr.*, 1957, pp. vii + 75, 1 map. [Received April, 1958]

The regions dealt with are the North-western Transvaal bushveld and the Molopo region. The situation, topography, rainfall, soil types and vegetation of each area are briefly described. In the bushveld region about half of the farms visited in 1950–2 were of less than 2000 morgen [1 morgen = 2·1165 ac.] and many were so small as to be uneconomic. On an average, 2% of the total farm

area was under cultivation. Maize occupied about 25% of the cultivated area and groundnuts about 33%. In the southern and central parts of the region, dry-land cropping increased earnings, but it is doubtful whether this would pay in the long run. In the Molopo region the largest % of farms is in the 2000–3000 morgen group and a number are over 7000 morgen. Only about 0·3% of the total farm area is under crops. The capital invested, the methods of cattle management and the factors influencing the financial results in both areas are discussed.—A.M.H.

1284† Kuhn, B. D. and Kayo, S. **Preliminary report on agricultural land use in Okinawa.** *Sci. Bull. Univ. Ryukyus* 1956, No. 5, 262–309, illus.

In this land-use survey 3 areas, each with different farming conditions, were selected for study : one entirely rural ; another where the agriculture was influenced by military occupation ; the third a rice-producing area. For each area the report gives information on soil, characteristics of the population, land ownership and utilization, size of fields and walking distance to and from fields, labour, sources of power for cultivation and transport, farm animals and their fodder supplies, crops and cropping practices, marketing of produce and water supplies. Suggestions for improvement are made.—D.B.

1285† Digby, Margaret. **Co-operatives and land use.** *Agric. Devel. Pap. 61 FAO* 1957, pp. 115, bibl. 27.

The object of this paper is to show how, in various countries of the world, farmers have endeavoured to widen the scope of their operations and to increase their production by co-ordinating their efforts with those of their neighbours. Information is given on co-operative farming projects, from the fully collective and compulsory type to those with less comprehensive functions, e.g. erosion control and joint pasture management. The subject is dealt with under the following principal heads : co-operative land settlement ; co-operative fusion of existing farms ; co-operative development of traditional communal agriculture ; joint production without land pooling. An assessment is given of the advantages, disadvantages and difficulties which can be expected from adopting one or more of the various land-use types of co-operative.—E.B.O.

1286† OEEC. **Land consolidation. Cheaper and more simplified methods.** *Project 199 OEEC* 1957, pp. 129.

A seminar was held in Wiesbaden in June-July, 1955, to study the problem of fragmentation of agricultural holdings in OEEC countries (estimated to involve 28 million ha.). This report gives the papers presented and the recommendations made.—E.B.O.

FARMING SYSTEMS AND PRACTICES

See also Abs. 1329, 1355

1287† Yates, F. and Patterson, H. D. **A note on the six-course rotation experiments at Rothamsted and Woburn.** *J. agric. Sci.* 1958, **50**, Pt 1, 102–9, bibl. 1. [Rothamsted Exp. Sta., Harpenden, Herts]

The results of an interim examination of experiments on the effects of N, P and K on a 6-course crop rotation are reported. The rotation, started in 1929–30, was originally barley/clover-hay/wheat/potatoes/forage crop (cut green and followed by a catch crop)/sugar-beet. In 1933–4 the forage crop was replaced by rye. It has become apparent that the main aim of the experiments – to relate the effects of fertilizers to weather conditions – is not being fully realized. This is in part a consequence of the design, which has inherently low accuracy and results in low responses to P and K, and in addition, faulty randomization. At Woburn, fertility irregularities and pest damage have further reduced the accuracy attained. The implications and significance of these findings are discussed.—M.P.

1288† Simon, W. Anbauwürdige Fruchtfolge-Paare. [**The preceding crop and its suitable following crop.**] *Z. Acker- u. PflBau* 1957, **104**, No. 2, 169–80, bibl. 18. [Inst. Acker- u. PflBau, Müncheberg (Mark), E. Germany]

This work is an attempt to place recommendations for a rotation on a scientific basis rather than an empirical one. The author believes that it is more important to limit advice to 2 successive crops than to give advice on the whole rotation, so long as the time interval before repeating a crop is taken into account. An " anbauwürdige Fruchtfolge-Paar " consists of a preceding crop and a following crop which is suitable as regards climate, soil and farm management. Based on experiments carried out in 1951–3, in which the preceding value of a crop was tested under several cultivation conditions, a table has been drawn up which shows crops which are suitable for following wheat, rye, barley, oats, maize, rape, flax, legumes, potatoes, sugar- and fodder-beet and lucerne/clover, under 3 climatic conditions and several soil conditions. By the use of notation, much information has been concentrated into this table.—D.B.

1289† Kemenesy, E. Einige Komplexfragen der Vorfruchtwirkungen im Trockengebiet. [**The complex of problems involved in the preceding-crop effect in a dry climate.**] *Z.*

Acker- u. PflBau 1957, **104**, No. 2, 191–203, bibl. 12. [Akademie der Wissenschaften, Budapest, Hungary]

The preceding-crop value of 27 crop plants was tested in the conditions of an extreme continental climate. When winter wheat was used as the following crop, a legume was the best preceding crop and a root crop the worst. Soil moisture, manuring, the stage of harvesting other than at maturity, shade, and density of root growth contribute to the complexity of determining preceding-crop value. Clover/grass had a better preceding effect than had clover alone, and perennating fodder crops than annual ones.—D.B.

1290† Bobrickaja, M. A. [**The role of annual crops in maintaining the balance of organic and mineral substances in the soil.**] [Russian] *Počvovedenie* (*Pedology, Moscow*) 1958, No. 1, 44–55, bibl. 9, illus. [Dokučaev Soil Inst.]

The data recorded were obtained from field studies during 1953–5 in the Šadrinsk area of the Kurgan Province [55°N. lat., 65°E. long.]. In the dry climate of the Trans-Urals, the value of a herbage break in a crop rotation for maintaining soil fertility is questionable. The advantages of substituting annual crops (wheat and annual legumes e.g. *Pisum, Vicia, Ervum*) for the herbage and utilizing the system of tillage advocated by T.S. Mal'cev are discussed from the standpoint of maintaining nutrients in black earths.—M.H.

1291 Van Parijs, A. Rotations des plantes vivrières dans la région de Nioka (Haut-Ituri). [**Rotations of food crops in Nioka region (High-Ituri, Belgian Congo).**] *Bull. agric. Congo belge* 1957, **48**, No. 6, 1515–44. [Sta. Rech. Agron., Nioka]

An account is given of studies on the following: position of crops in the rotations, the principal crops being maize, sorghum, *Eleusine* sp., buckwheat, sweet-potato, cassava and beans ; influence of the preceding crop and of a good soil cover ; different methods of starting the rotation (burning, ploughing-in, mulching) ; control of weeds, mainly *Digitaria scalarum* ; intercropping. The farming calendar and some crop rotations normally practised in the Ituri are described.—E.B.O.

1292 De Schlippé, P. Le nomadisme agricole. Son envergure. Ses remèdes. [**Shifting cultivation. Its extent and remedies.**] *Ann. Gembl.* 1957, **63**, No. 4, 268–92, bibl. 5, illus.

A description is given of shifting cultivation, which is said to be " a way of life " opposed, by its nature, to any progress. The position of shifting cultivation in the development of man since prehistoric times is examined. Shifting cultivation is a backward form of agriculture by which a great number of people in the world (about 200 millions on 36 million sq. km., or 6 inhabitants per sq. km.) are still at the neolithic stage, the cause being attributed to the rapid loss of fertility of tropical soils. The lines along which a solution must be sought are indicated. The soil defects must be corrected and studies to achieve this should be increased. The first step is to replace the long-duration natural forest fallow, which entails burning, by an artificial fallow of grasses or shrubs, which can be easily removed. A complete knowledge of each region, with good administration and teaching, are indispensable for promoting the necessary social revolution. It is advocated that the world documentation of research into loss of soil fertility, and other problems related to shifting cultivation, should be collected at one centre, to be at the disposal of a qualified staff.—E.B.O.

SOIL AND WATER CONSERVATION

1293† Palmer, J. E. S. **Soil conservation at Mokwa, Northern Nigeria.** *Trop. Agric., Trin.* 1958, **35**, No. 1, 34–40, illus. [N. Reg. Dep. Agric., Nigeria]

The soil-conservation system employed at Mokwa is described ; the lay-out consists of interception-type terraces, on a variable grade, draining from access roads into grassed waterways.—M.P.

1294† Rensburg, H. J. van. **Gully utilization and erosion control.** *E. Afr. agric. J.* 1958, **23**, No. 3, 190–2, bibl. 2, illus. [Vet. Res. Sta., Mpwapwa, Tanganyika]

The value of *Cynodon plectostachyum* and *Pennisetum purpureum* for gully stabilization and as a source of fodder or grazing is demonstrated.—M.P.

1295 Kawai, K. and others. **Studies of cropping systems for soil conservation against erosion. 3. Influences of tobacco and [sweet-] potato cultivation.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1957, **26**, No. 1, 63–4, bibl. 3, illus. [Hiroshima Prefecture Agric. Exp. Sta.]

Sweet-potato plants grown directly from seed tubers set in the field showed very remarkable effects in controlling soil erosion, compared with plants grown from transplanted slips ; the former grew earlier and covered greater areas of the ground than the latter. F. Eng. s.—D.B.

AGRICULTURAL METEOROLOGY AND CLIMATOLOGY

See also Abs. 1329

1296† Bagnouls, F. and Gaussen, H. Les climats biologiques et leur classification. [**Biological climates and their classification.**] *Ann. Géogr.* 1957, **66**, No. 355, 193–220, bibl. 11, illus.

Present systems for the classification of climates have their defects and the authors attempt to overcome these in the new system which they expound. Their classification is based on the rhythms of temperature and rainfall throughout the year, as shown by monthly means. Principal consideration is given to the periods, such as hot, cold, dry or wet, which are favourable or unfavourable to the vegetation. Six biological climates are distinguished and defined. The system (successfully applied in India, east and west Pakistan, Indochina and the whole of South America, also Europe and Asia Minor) enables the relationship between the vegetation and the different bioclimatic types to be established clearly. The temperature/rainfall diagrams can be used to determine and express the climatic conditions suitable for a particular plant. It should then be possible to list the regions where similar crops can be cultivated.—M.P.

1297† Griffiths, J. F. **Climatic zones of East Africa.** *E. Afr. agric. J.* 1958, **23**, No. 3, 179–85, bibl. 2, 1 map. [E. Afr. Vet. Res. Org.]

Ten climatic zones are distinguished.—M.P.

1298† Bhakthavathsalu, C. M. and Balasubramanian, C. **A note on the statistical assessment of probability of rainfall and its agricultural significance.** *Madras agric. J.* 1958, **45**, No. 3, 110–13, bibl. 4.

The probability of deviations from the mean annual rainfall has been calculated from rainfall records in the Nagercoil-Kanyakumari District made during the period 1921–56. The value of this concept in assessing long-term crop risks is discussed.—D.B.

1299† Balasubramanian, C. **Monsoons in Coimbatore.** *Madras agric. J.* 1958, **45**, No. 1, 13–18.

Records made over the past 50 years of the S.W. and N.E. monsoons have been analysed to calculate average rainfall and its variation as regards quantity, number of rainy days and duration of the monsoon. The S.W. and N.E. monsoons have a tendency to fail once in 8 and 14–15 years, respectively.—D.B.

1300† Smith, L. P. **Duration of high relative humidities.** *Met. Mag., Lond.* 1956, **85**, 229–32, illus.

1301† Smith, L. P. **Length of frost-free period [in Britain].** *Met. Mag., Lond.* 1954, **83**, 81–3.

1302 Robertson, G. W. **The standardization of the measurement of evaporation as a climatic factor.** *Tech. Note 11 World Met. Org.* (*WMO No. 42. TP. 16*) 1955, pp. 10, bibl. 14, French, Russian, Spanish summaries.

1303 Hirst, J. M. **A simplified surface-wetness recorder.** *Pl. Path.* 1957, **6**, No. 2, 57–61, bibl. 4. [Rothamsted Exp. Sta., Harpenden, Herts]

The length of time plant surfaces remain wet is important in relation to fungal attack. An instrument for recording these periods is described which uses a non-living test surface of polystyrene to simulate apple foliage. It is suggested that by matching test surfaces the leaves of other plants could be simulated.—G.L.S.

1304† Bowden, B. N. **The radiation error of air temperature measurement by Stantel type F thermistors and simple methods to reduce it.** *J. Ecol.* 1958, **46**, No. 1, 143–8, bibl. 2. [Regional Res. Sta., Samaru, N. Nigeria]

1305† Achtnich, V. W. Eine Methode zur Berechnung des Wasserverbrauchs der Pflanzen mit Hilfe klimatologischer Daten. [**A method for calculating the water consumption of plants with the help of climatological data.**] *Z. PflErnähr. Düng.* 1957, **79**, No. 2, 97–101, bibl. 12, illus.

The formula of Blaney and Criddle (USA) U = KF (where U = water uptake, K = plant coefficient, F = sum of monthly climatic factors) has been adapted for metric-system data. Additional plant coefficients have been determined including some for Mediterranean and tropical climates, and an example is given of the application of the formula to cotton cultivation in Bagdad. —D.B.

1306 Zillmann, K. H. Über den Wasserverbrauch einiger Kulturpflanzen am Standort in Abhängigkeit von den meteorologischen Faktoren und von der Bodenfeuchtigkeit. [**The consumption of water by some crop plants in the field in relation to meteorological factors and soil moisture.**] *Z. Acker- u. PflBau* 1957, **104**, No. 3, 257–74, bibl. 26. [Inst. Acker- u. PflBau, Humboldt-Univ., E. Berlin]

Modifications in transpiration caused by the meteorological factors of sunlight, air temperature and relative humidity of the air, and by soil moisture were examined in spring barley, oats and spring rape. For each of these crops, soil-moisture

conditions have been determined for the 3 stages : (1) plentiful water supply, (2) threshold of water shortage, (3) acute water shortage. It is stressed that the results (which fall into line with those obtained from irrigation experiments on these crops) hold for the conditions at Glasow-Kienitsberg only.—D.B.

1307† Filzer, P. Weitere Beiträge zur Ökologie des Pflanzenerträges. [**Further contributions on the ecology of plant yields.**] *Ber. dtsch. bot. Ges.* 1957, **70,** No. 8, 389–400, bibl. 6. [Bot. Inst., Univ. Tübingen, W. Germany]

The relationships between climate, rainfall and crop yields in different regions of Germany, together with a study of the proximity of these regions to urban areas have been investigated. The crops studied were oats, winter rye, winter wheat, spring barley, potatoes, clover and grass.—M.P.

1308† Atanasiu, N. and Kruse, B. Zur Frage der künstlichen Beregnung in Beziehung zum Klima. [**Water-sprinkling in relation to climate.**] *Z. Acker- u. PflBau* 1957, **104,** No. 2, 137–44, bibl. 14. [Inst. Steigerung der Pflanzenerträge Paulinenaue, E. Germany]

By means of graphs and diagrams the authors show that the climatic water-balance (precipitation minus evaporation) is superior to other criteria used, viz. soil moisture and rainfall, for determining the time for applying artificial rain. The experiments reported in *Fld Crop Abstr.* 6 : 853 are discussed in the light of the climatic water-balance. It is pointed out that evaporation is often entirely neglected.—D.B.

1309† Irwin, R. W. and Tiessen, H. **Note on an automatic start device for frost control by sprinkler irrigation.** *Canad. J. Pl. Sci.* 1958, **38,** No. 1, 118–19, bibl. 1, illus. [Ont. Agric. College, Guelph]

1310† Matzner, F. Die Hagelgefährdung der mittleren Bezirke der Deutschen Demokratischen Republik. [**Hail damage in the central region of Eastern Germany.**] *Dtsch. Landw.* 1958, **9,** No. 3, 125–9, bibl. 8, maps. [Inst. Acker- u. PflBau, Univ. Jena, E. Germany]

1311 Bourke, P. M. A. **The forecasting from weather data of potato blight and other plant diseases and pests. (First Report of the Working Group on Weather and Plant Pathology Problems, of the Commission for Agricultural Meteorology).** *Tech. Note 10 World Met. Org.* (*WMO No. 42. TP. 16*) 1955, pp. 48, bibl. 116, illus., French, Russian, Spanish summaries.

MISCELLANEOUS

1312† Casini-Ropa, G. La selezione meccanica dei semi. [**Mechanical seed cleaning and sorting.**] *Sementi elette* 1957, **3,** No. 5, 30–43, and No. 6, 38–50, bibl. 19, illus., English and German summaries. [Ist. Mecc. Agr., Univ. Bologna, Italy]

Information is given on the principal seed-cleaning machines used in Italy and other countries, and on their working. A table gives size and superficial characters of the seeds of some crops and weeds.—E.B.O.

1313 Goulden, C. H. and Mason, W. J. **An electronic seed counter.** *Canad. J. Pl. Sci.* 1958, **38,** No. 1, 84–7, illus. [Central Exp. Farm, Ottawa]

An electronic device for counting seeds in the size range from flax to barley has been developed. The device consists essentially of a vibration feed which feeds the seeds individually to a counter. The impact of the falling seeds on a piezo-electric crystal gives rise to electrical impulses which are amplified and counted. The accuracy of counting is good. The speed of counting varies from 200 to 300 per min. F.S.—D.B.

1314† Det Landøkonomiske Driftsbureau. Undersøgelser over landbrugets driftsforhold. 40. Regnskabsresultater fra danske landbrug i året 1955–56. 2. del. [**Investigations on the economics of agriculture. 40. Farm costing figures from Danish agriculture during the year 1955–6. Pt 2.**] [*Publ.*] *Det Landøkonomiske Driftsbureau* 1957, pp. 150.

1315† Schmittner, F. Die Anwendung der land- und forstwirtschaftlichen Betriebskarte in der Betriebsberatung und Betriebsplanung. [**Using the farm- and forestry-management form in the agricultural advisory and planning service.**] *Bodenkultur* 1957, **9,** No. 4, 403–21, bibl. 5. [Agrarwirtschaftliches Inst., Hochsch. f. Bodenkultur, Wien, Austria]

The author discusses the new farm-management form which has been devised for use by the agricultural advisory service. The form, a specimen of which is given, is designed to give a general view of the management of a farm under present-day conditions and to facilitate the solution of problems which may arise. It records information on : type of holding ; labour ; farm buildings ; power and machinery ; areas under arable crops, fodder crops, pasture, orchards, and woodland ; livestock ; purchases ; production ; farmyard-manure balance ; membership of trade groups ; and participation in improvement schemes.—D.B.

1316 Edinger, W. Arbeitsaufwand und Arbeitsproduktivität in einem bäuerlichen Familienbetrieb des Waldviertels. [**Labour costs and labour productivity in a peasant family holding in the Waldviertel (Austria).**] *Bodenkultur* 1957, **9**, No. 4, 422–42, bibl. 9. [Agrarwirtschaftliches Inst., Hochsch. f. Bodenkultur, Wien, Austria]

A system of book-keeping of labour costs on a 50-ac. farm is described.—D.B.

1317 Colonial Advisory Council of Agriculture, Animal Health and Forestry. Great Britain. **A symposium on the operating costs of machinery in tropical agriculture.** *Publ. 4 Colon. Adv. Counc. Agric., Anim. Hlth, For.* 1957, pp. vii + 59, London : H.M.S.O., 7s. 6d.

Papers presented included : Cost of mechanized agriculture in Nigeria, by W. T. Newlyn ; Analysis of tractor costs on a rice farm in Tanganyika, by N. R. Fuggles-Couchman and H. E. Hubbard ; Economic aspects of contract ploughing in Uganda, by R. K. Kerkham and others ; The estimated cost of rice production on the proposed small mechanized paddy farms in the Federation of Malaya, by D. W. M. Haynes ; The use of records and accounts in the development of systems of mechanized farming in the tropics, by J. R. Raeburn.—M.P.

1318 McFarquhar, A. M. M. and Evans, A. **Linear programming and the combination of enterprises in tropical agriculture. 1. The method, its advantages, and a general example.** *J. agric. Econ.* 1957, **12**, No. 4, 474–97, bibl. 8.

1319 Donovan, D. **Aerial spraying for bird pests.** *New Commonw.* 1958, **36**, No. 6, illus., 273.

Aerial spraying has been successfully used to destroy the Dioch [*Quelea* spp.], [see review article in *Fld Crop Abstr.* Vol. 10, No. 3] in their breeding grounds in E. Africa. The spray is a combination of parathion, diesel oil and naphthalene and about 3 gal. of the mixture are required to treat one acre. The total cost per acre averages £50.—C.L.S.

1320† Government Committee for the Compilation of the List of Varieties of Field Crops. Netherlands. 33e beschrijvende rassenlijst voor landbouwgewassen 1958. [**Thirty-third descriptive list of field crop varieties, 1958.**] 1958, pp. 336, English commentary.

1321† OEEC. **Agricultural advisory services in Europe and North America 1957.** *Project 395/A OEEC* 1958, pp. 166.

This is a report of an international conference held in Paris, in June 1957, to review recent developments in the agricultural advisory services in Europe, the USA and Canada and to discuss new projects. The papers presented and the recommendations made are given.—E.B.O.

1322 Fielding, W. L. **Trends of agricultural thought and research in the Federation of Rhodesia and Nyasaland in the last twenty-five years.** *Emp. J. exp. Agric.* 1958, **26**, No. 102, 183–94, bibl. 66.

Work at the various centres for agricultural research in the area is described. The broad distinctions of soil and climatic types and the factors influencing the production of maize, wheat, cotton, potatoes, groundnuts and sorghums are discussed. The most important general trend is the inclusion of grass leys in farming systems.—A.M.H.

1323 Köhnlein, J. and Knauer, N. Die Entzugszahl als Hilfsmittel zur richtigen Bemessung der P_2O_5- und K_2O-Gabe. [**The (nutrient) extraction rate as an aid to the correct determination of P_2O_5- and K_2O-applications.**] *Z. Acker- u. PflBau* 1957, **104**, No. 4, 329–70, bibl. 41. [Inst. f. Acker- u. PflBau, Univ. Kiel and Inst. f. Futterbau, Bundesforschungsanst. f. Milchwirtsch., Kiel, W. Germany]

The paper includes a table showing the weight in kg. of P_2O_5 and K_2O withdrawn from the soil for a given yield of the most important cereals, pulses, oil- and fibre-plants, green-fodder and hay crops cultivated in Germany. An example demonstrates the calculation of manurial requirements of arable land and grassland from these nutrient extraction rates.—D.B.

REPORTS

The notes below indicate the main investigations in the reports covered, in so far as they concern this journal. Where a separate abstract has been made from a particularly interesting section of a report, this is indicated.

1324 **Great Britain.** Edinburgh and East of Scotland College of Agriculture. Report for the year ending 30th September, 1957. Edinburgh, [n.d.], pp. 142.

Phosphatic fertilizers, pp. 53–5. Studies are being continued on the phosphorus recoveries from swedes of phosphates applied to the previous oat crop. In experiments with ^{32}P-labelled superphosphate on potatoes, emergence was delayed by phosphates but irrigation increased the uptake. In pot experiments with oats, irrigation stimulated uptake of fertilizer P and a rise in soil temperature increased soil P uptake. Effect of N, P and K on potato yields, pp. 56–7. The risks associated with 60 : 60 : 90 mixtures of N : P_2O_5 : K_2O fertilizers have been demonstrated when used at more than 10 cwt./ac. in years with early dry periods.—M.H.F.

1325 **Republic of Ireland.** Twenty-sixth Annual Report of the Minister for Agriculture 1956–7. Dublin, 1958, pp. 173 + append. 82. [Received May, 1958]

1. Tests of spring wheat varieties, p. 51. In tests at 60 centres Peko gave the highest average yield and Svenno the lowest, with no significant difference between Atson and Peko.
2. Tests of oat varieties, p. 51. Glasnevin Triumph, Rex, Blenda and Pendek were tested at 53 centres. Glasnevin Triumph gave the highest average yield, but differences were not significant.
3. Tests of barley varieties, p. 51. In tests at 62 centres S.A.K. 33 gave the highest average yield, and was significantly superior to Herta.
4. Fodder-beet trials, p. 52. Hinderupgaard XI and Hunsballe XI gave higher yields of root dry-matter than sugar-beet and Pajbjerg Rex XI, in trials at 33 centres. In a second series of trials at 34 centres, Rød Øtofte XI gave significantly greater yields of dry matter than Yellow Globe and Barres Øtofte Nova XI.
5. Mn deficiency in wheat, p. 53. Methods for remedying and preventing Mn deficiency were compared. In some cases 14 lb. $MnSO_4$ combine-drilled gave results equal to 1 cwt. broadcast [rate of application not stated].
6. A procedure for dealing with the special problems of sowing cereals on reclaimed peatland is described, p. 90.—A.M.H.

1326 **Italy.** Stazione Agraria Sperimentale, Bari. Relazione sull'attività della Stazione nel decennio 1947–56. [Report on the work of the Station during 1947–56.] 1957, pp. 161, bibl. 128, illus.

1. Wheat, pp. 13–18. The soft wheat variety Maiorica 47, selected at the Bari Station, is the best of those grown in the area. Information is given on the cultural requirements of soft wheat varieties introduced from northern and central Italy.
2. Maize, pp. 26–8. Grain yields are given of hybrids grown with or without irrigation.
3. Industrial crops, pp. 29–35. To improve agriculture in southern Italy it is necessary to find renovating crops, to be grown in rotation with wheat, which are economically more advantageous than beans (*Vicia faba* var. *major*), now the only crop of this type. Various crops have been tested, sown in either spring or autumn. Cotton is promising, particularly the variety Greece 1, which yielded 2000 kg. raw cotton/ha. In varietal trials with flax (*Linum usitatissimum*), Altamurana gave the highest seed yield (610 kg./ha.) and Blue from Holland the highest straw yield (1200 kg./ha.). Flax for fibre is not considered a suitable crop for southern Italy. When grown for seed, the seed rate of 50 kg./ha. should not be exceeded. The cultivation of sugar-beet sown in autumn appears practicable with the new varieties resistant to bolting, the best for resistance to bolting and productivity being Klein AA and Cesena N.S.A. ; when sugar-beet is harvested during 15–31 July, the average sugar content is 17·7% and the root yield 30,000 kg./ha.
4. Green manuring, pp. 38–40. See *Fld Crop Abstr.* 5 : 1284.
5. Agricultural meteorology, ecology and biostatistics, pp. 93–100. A brief account of work is given.—E.B.O.

1327 **Cyprus.** Department of Agriculture. Annual Report for the year 1956. By W. Allan. Nicosia, 1957, pp. 57.

1. Cereals, p. 39. In yield trials, the Australian soft wheat varieties Bencubbin 48 and Bungulla gave good results for the third year in succession, particularly under rain-fed conditions. In 2 years' trials, the durum wheat variety Kyperounda Yiallouriko yielded on average 10–25% more than other varieties. Trials at Government Farm, Morphou, showed that a seed rate of 6 okes (1 oke = 2·8 lb.) per donum (0·33 ac.) gives yields of wheat as high as heavier rates.
2. Safflower (*Carthamus tinctorius*) gave yields as good as wheat and better than barley, and was drought resistant, p. 39.
3. Groundnut variety Virginia Bunch, yielded well and matured earlier than the local type, p. 39.
4. Weed control, p. 41. For controlling *Zizyphus lotus*, a noxious shrub on arable land, promising results were obtained by spraying the plants with

esters of 2,4,5-T (5 lb. of acid equivalent per gal.) in diesel oil.—E.B.O.

1328 **Northern Rhodesia.** Department of Agriculture. Annual report for the year 1956. Lusaka, 1957, pp. 19. [Received May, 1958]

Herbicides, p. 12. Chloracetimide derivatives, e.g. CDAA, showed promise for the control of *Eleusine indica* when used as a pre-emergence spray in maize. Groundnuts, p. 13. The outstanding quality of the groundnut variety Mwitunde was confirmed.—A.M.H.

1329 **Canada.** Minister of Agriculture. Report for the year ended 31 March, 1957. Ottawa, 1957, pp. 159.

1. Agricultural meteorology, p. 92. (a) A plastic mounting for the black Bellani plate atmometer, now used on Experimental Farms and Illustration Stations, facilitates the measurement of latent evaporation of the air. The measurements are used in drought studies and for estimating irrigation requirements. (b) Rainfall and temperature records over the past 66 yr. were analysed and the data used for calculating daily soil-moisture deficiencies which, in turn, showed the probable irrigation requirement.

2. Weed control, p. 93. (a) Wild oats [*Avena fatua*] on prairie farms. The best cultural control was obtained by delayed sowing (first week in June) of a rapidly-maturing barley, the land having been first tilled in spring. The studies also showed that wild oats are not a problem under long rotations if the land is in grass and legumes for 2–3 yr. out of 8. (b) Wild oats in sugar-beet and in canning peas. IPC, when incorporated in the soil at the time of sowing the above crops, gave good control of wild oats without injuring the crop. (c) Wild buckwheat [*Polygonum convolvulus*]. 90% of this weed in cereal crops has been killed by 2 spray applications of 2,4-D ester or MCPA ester at 5 oz./ac., the first application being made when the weed is in the first or second true-leaf stage, the second 1 week later. (d) Russian thistle [*Salsola kali*] in flax. Experiments over several years with a number of different herbicides showed that the ester of 2,4-D consistently gave the best results. When applied at 6 oz./ac. approximately 1 month after sowing, good flax yields were obtained without undue delay of maturity. (e) Field bindweed [*Convolvulus arvensis*]. This was eliminated when sprayed with 2,4-D at 2 lb./ac. in the late summer of a summer-fallow year.

3. Continuous cropping and alternate crop and fallow, p. 93. Experiments at Swift Current from 1946–56, showed that continuous wheat produced an average of 15·8 bu. per cultivated ac. whereas alternate wheat and fallow produced an average of 10·7 bu. per cultivated ac. The comparable figures for oats were : continuous 32·2, alternate 22·9 bu. ; for barley : continuous 25·6, alternate 17 bu.

4. Irrigation of potatoes, p. 94. As a result of a 4-yr. study in S. Ontario, the following irrigation recommendations for early potatoes were made : from late May to early July, on light soils, 1 in. of irrigation water per week ; on heavier soils, 1·5 in. every 10 days.—D.B.

1330 **Hong Kong.** Director of Agriculture, Fisheries and Forestry. Annual departmental report for the financial year 1956–57. Hong Kong, [n.d.], pp. 114, illus.

Rice. Production, pp. 3 and 98–9. In a spacing trial, the spacings 12 × 12 in. and 9 × 10 in. were best, p. 38. In a varietal trial of second-crop rice, Leung Cho Kuk, a first-crop variety, yielded best, pp. 38–9. Sweet-potato. The results are given from trials to determine the best varieties for production of roots and/or vines, pp. 41–2. —E.B.O.

BOOKS

1331 Žukovskiĭ, P. M. [Ed.] [**Wheat in the USSR.**] 1957, pp. 632, illus., Moscow/Leningrad : State Publ. Agric. Lit., 16 roubles, 35 kopeks.

There is information on methods of cultivating winter- and spring-wheats in different parts of the Soviet Union. [See *Pl. Breed. Abstr.* 28 : 2426.] —M.H.

1332 Stehlik, V. and others. Řepařství. [**Sugar-beet-growing.**] 1956, pp. 430, bibl. 103, illus., 24 × 18 cm., Prague : Czechosl. Acad. Agric. Sci. [Received March, 1958]

1333 MacFarland, C. S. [Ed.] **American Potato Yearbook.** 1958, pp. 80, bibl. 295 in text, 6 maps, 15 × 22·5 cm., Westfield, New Jersey : C. Stedman Macfarland, $2.

This publication is primarily addressed to growers and handlers of potatoes in the USA. The contents include a paper entitled " Pointers on potato washing and waxing ", by H. Findlen (pp. 17–19), a list of recent references to the literature on potato culture and research in the USA and Canada, details of standards for ware and seed potatoes current in the USA, together with statistics of USA and Canadian potato production.—R. Boyce.

1334 Piacco, R. Manuale di risicoltura. [**Handbook on rice-growing.**] 1957, pp. 149,

bibl. 4, illus., 21 × 13 cm., Bologna : Edizioni Agricole, 900 lire.

This booklet describes in a simple, concise and clear manner the methods used for growing rice in Italy. The earlier chapters are concerned with the lay-out of rice-farms. These are divided into sections, each of which receives irrigation water through a second-order conductor. Each section consists of several fields. In the old rice areas of Piedmont and Lombardy, the fields are irregular in shape. The largest rice farm (800 ha.) in Vercelli province includes 66 fields, the largest of which is 20 ha. In newly reclaimed areas (Bologna, Ferrara, etc.), the rice-fields are symmetrical. A field is divided by banks into compartments, the bottoms of which are carefully levelled ; the area of a compartment varies from a maximum of 4 ha., exceptionally 7, to 1 ha., sometimes only 1000 sq. m. in areas where levelling is difficult. Some of the banks, mainly those which surround the fields, are permanent, some are kept for 2–4 yr. and others are remade every year. The banks are made by manual or by semi-mechanical means. The irrigation network, and the movement of water through it, are explained. A primary water conductor brings the water to the farm raising it to the highest level from which it is distributed by gravity through the water conductors of the secondary, and lower, orders. The water is drawn away through a colature system. The chapter on planning and preparing the land for rice includes a study of soil requirements and levelling. Rice is grown mainly in a rotation but there are also areas of permanent or semi-permanent rice-fields. Continuous rice-growing gives good yields of rice, comparable with those obtained from a rotation, but has many disadvantages, such as the very high costs of fertilizers and weeding. Information is then given on : rotations ; cultivation works (mainly effected in March/April) ; manuring ; varieties ; sowing (late March-early May) ; irrigation (all rice is grown with continuous submersion) ; weed control; transplanting (practised on 41% of the total rice area) ; harvesting (September-October) ; threshing and drying. Finally, the last chapter deals with the winter care of rice-fields, which consists mainly in draining away the rainwater and attending to the trees which are grown on the banks. This book, although of modest appearance, is abundantly illustrated with photographs, drawings (in particular of machines employed) and diagrams, which are of assistance in reading the text. [A review article on rice-growing in Italy will be published in volume 12 of this journal. Ed.]—E. Biasutti Owen.

1335 Brown, H. B. and Ware, J. O. **Cotton.** 3rd edn, 1958, pp. x + 566, bibl. at end of chaps, illus., 23 × 16 cm., New York and London : McGraw-Hill Book Co., Inc., 93s.

' Brown on Cotton ' has long been a standard work, the issue being only slightly confused by the fact that another author, C. H. Brown, is an authoritative writer on Egyptian cotton. The first edition of this book was published in 1927. Prof. H. B. Brown has now retired, and the present edition has been largely re-written by Prof. J. O. Ware, with the assistance of specialists in certain sections. In its new form the book has more competitors to face than did the original edition, and indeed the McGraw-Hill Book Co. themselves have recently published other books that partly overlap it in subject-matter. This competent revision should, however, enable it to hold its own.

It is as a picture of the American, not the world-wide, cotton industry that the book must be regarded. All aspects from the botany of the crop through its cultivation to marketing and manufacture are adequately covered for the student. The sections on marketing, manufacture, and commerce contain all or more than the grower needs to know of these subjects, but they are obviously not intended for those who are professionally engaged in these aspects of cotton. In the scientific description of the crop, the text is, presumably by design, somewhat " written down " to the student. It is, however, a little difficult to know quite what class of reader is aimed at when in one section the authors stop to define such terms as " morphology " and " phyllotaxy " while in others far more abstruse terms are used without explanation. The language and spelling are occasionally difficult to follow for a British reader.

Different parts of the text appear to have been completed in 1955 and 1956. Figures quoted show that in 1955, 23% of the United States cotton crop was harvested mechanically, but there is no record of the use of such machines in any other country. It is considered that in the USA share-cropping and the tenant system tend to diminish as mechanization develops.

The sections devoted to cotton production outside the USA remain short and hardly give more than the minimal information which would be required by the American student. The authors suffer from the usual inability of writers on world-wide crops to be correct on foreign details. Thus, Uganda cotton bales are not 480 but 400 lb. ; " Begunda Local " is a bad misprint for " Buganda Local ", which in any case can hardly be described as a " new strain ". Some of the political nomenclature is out of date. The chapter bibliographies are full, and include a fair proportion of British writings ; though in the general discussions of the physiology of the cotton plant and of its response to fertilizers, more foreign data might have been quoted with advantage.

But as a source of information on the American cotton crop at the agronomist's level, the book will

have a renewed life as about the best available work of reference.—G. B. Masefield.

1336 Montenez, J. Recherches expérimentales sur l'écologie de la germination chez l'arachide. [**Experimental investigations into the ecology of germination in groundnuts.**] 1957, pp. 130, bibl. 59, illus., English and Flemish summaries, 23 × 15 cm., Brussels: Dir. Agric. Forêts et Élev., 70 Belg. frs.

This study on the effect of the principal ecological factors on groundnut germination was carried out mainly with the variety A 65 of the Valencia type. From an ecological point of view groundnut germination begins with seed imbibition and ends when the cotyledons show at the surface of the soil. Sowing depth is determined by the texture of the substratum and the size of the seed. In a moist, sandy substratum, the optimal depth for germination is 2–3 times the average length of the seed. The optimal depth decreases as the clay content in the substratum increases. Temperature and light influence favourably the rate of imbibition, while the external osmotic pressure hinders it. Groundnut seed has, however, a high suction force as it can attain the level of moisture required for germination (62% of its dry weight) with an osmotic pressure as high as 30 atmospheres. A substratum saturated with water is optimal during imbibition. When the vital phase begins and the requirement for air is greater than that for water, the optimal amount of useful water in the soil falls to 50–60%. Continuous, or intermittent, light has a favourable effect on seed imbibition and the growth of the cotyledons, but limits root formation and the development of the embryo. The germination curve as a function of temperature has not yet been studied, but the following temperature data for germination have been determined : minimum 15°, optimum 34°, maximum 41°C. The embryo is killed above 54° and below 5°C. Respiration is inhibited in a soil with a high content of clay or of water. Optimal conditions for germination are a sandy substratum with 45–70% water and 4–5 pH value.—F. French s. —E.B.O.

1337 Adam, J. and Ferrand, M. Oléagineux de l'Afrique intertropicale française (Afrique Noire-Madagascar). Tome 1. Première partie. Culture. [**Oil crops in French tropical Africa (Negro Africa-Madagascar). Vol. 1. Pt 1. Cultivation.**] [n.d.], pp. 106, bibl. in text, illus., 31 × 22 cm., Paris : Encyclopédie d'Outre-mer. [Received Feb., 1958]

The environment and agricultural techniques in tropical regions, as far as oil crops are concerned, are described in an introductory chapter. Among the crops dealt with in separate chapters are groundnuts and sesame, information being given on varieties, regions of cultivation, ecology, cultural methods and uses in the territories of Overseas France.—E.B.O.

1338 Bagot, Y. and Worms, P. Oléagineux de l'Afrique intertropicale française (Afrique Noire-Madagascar). Tome 2. Deuxième partie. Technologie des huiles et graisses d'origine tropicale. Troisième partie. L'économie des oléagineux de la zone intertropicale d'Afrique française. [**Oil crops in French tropical Africa (Negro Africa-Madagascar). Vol. 2. Pt 2. Technology of oils and fats of tropical origin. Pt 3. Economy of oil crops in the tropical zone of French Africa.**] [n.d.], pp. 102, illus., 31 × 22 cm., Paris : Encyclopédie d'Outre-mer. [Received Feb., 1958]

Part 2 gives information on the technology of oils from seeds of tropical crops, including groundnuts and cotton, and Part 3 on the production, marketing, exports and prices of these crops. [See also preceding Abs.]—E.B.O.

1339 Timoshenko, V. P. and Swerling, B. C. **The world's sugar. Progress and policy.** 1957, pp. 364, bibl. at end of chaps, 23 × 16 cm., Stanford, California: Stanford University Press, $6.50.

This volume is the 12th in the projected series of 20 published by the Food Research Institute of Stanford University, which are intended to illuminate different aspects of food and agriculture in relation to the 2nd World War. The scope of the present volume is considerably wider than this statement would imply and has been enlarged to provide a detailed survey of the long-range evolution of the world sugar industry and economy. The subject is introduced by an outline of intercommodity competition for sugar and sugar products and an overall review of world supplies of sugar, with particular reference to the 2nd World War. Part 2 opens with an account of the contrasts between the sugar yields from different parts of the world and between cane and beet crops, with observations on cropping systems and the relationship between crop tonnage and sugar recovery. This is followed by a review of the internal structure, organization and control of sugar production and, of particular interest to readers of this journal, an account of the mechanization of the sugar-beet crop, which is treated largely from the standpoint of developments in the USA. The account given of developments in that country is dominated by the rapid changeover in post-war years from a crop with a high labour requirement, based largely on a migratory labour force, to one in which sowing, cultivating and harvesting are mechanized. A striking feature of the picture is the willingness of the American farmer to avail himself of technical innovations and the rapidity with which the results of experimental work find practical application. Developments in sugar-beet

mechanization and sugar technology in the USSR are reviewed and contrasted with those in the USA, and the section ends with a brief account of similar developments in Western Europe. Part 3 deals in detail with sugar policy in peace and war in the USA, Western Europe, and the USSR, and with the International Sugar Agreement of 1953. It may be objected that little account is given of past and present developments in such parts of the world as Latin America and the Far East and the account of sugar-beet mechanization in Western Europe seems briefer than the importance of the subject would warrant. The subject of world sugar is one that lends itself peculiarly well to treatment both in depth, and from an overall standpoint, by virtue of the wealth of data that exists. A very extensive range of such data is drawn on to provide material for this volume and it constitutes an authoritative and surprisingly readable source of information, of value alike to historians, political scientists, economists and agriculturists seeking an understanding of the interrelationships between public policy and developments in the world sugar economy. There is a short index.—P. J. Boyle.

1340† Humphrey, N. **A review of agriculture and forestry in the island of St. Helena.** 1957, pp. 88, bibl. 11, 1 map, 24 × 15 cm., London: Crown Agents for Oversea Governments and Administrations, 15s.

This informative review of agricultural and forestry history and problems in St. Helena is an important contribution to the agricultural literature of the island, which is scanty. Part 2, Agriculture, includes short chapters on : land use, soil erosion, soil and water conservation, pasture improvement, types of arable land, soil fertility, mechanization, food-, farm- and export-crops. The author has dealt with his subject on a wide basis and gives full weight to the human problems of a small and isolated population, as well as to technical matters. This comprehensive, and very readable, review should be of considerable interest and value to those directly concerned with agricultural and forestry development in small, subtropical, oceanic islands where natural resources are poor.—A. G. G. Hill.

1341† Gillespie, J. and Hathaway, P. **A text-book of general agriculture.** 1956, pp. 367, illus., 22 × 14 cm., London : Macdonald & Co., Ltd., 30s.

This volume is intended as an up-to-date introduction to the science and practice of agriculture, primarily for students at Farm Institutes, schools and similar institutions. Aspects treated include : the soil, tillage, farm machinery, crop and grassland husbandry, pests and diseases of crops, animal husbandry including feeding and health, and weed control. There is a short index. —P. J. Boyle.

1342† Klapp, E. Lehrbuch des Acker- und Pflanzenbaues. [**A text-book of soil- and crop-cultivation.**] 5th edn, 1958, pp. 511, illus., 23 × 15 cm., Berlin and Hamburg : Paul Parey, DM 34·80.

Earlier editions of this book have been reviewed in *Fld Crop Abstr.* 7 : 1072 ; *Herb. Abstr.* 24 : 942 ; 17 : 1481 ; and 12 : 892. The revival of agricultural research since the Second World War and the increasing flow of published work in and outside Germany have led Professor Klapp to revise the 4th edition of his book on soils- and crop-cultivation. The original framework of the text remains and it has been unobtrusively brought up to date, partly by taking out older examples to make room for more recent work on subjects such as soil microbiology, plant protection, and rotations. to mention just three. As in earlier editions, about a third of the book is devoted to the techniques of cultivating arable crops including arable fodder-crops. Some crops appear for the first time in this section of the book, e.g. *Raphanus sativus* var. *oleifera*, *Nicotianum* spp., *Trifolium alexandrinum* ; others have been re-instated after being omitted from the 4th edition, e.g. *Lens culinaris* and *Helianthus tuberosus*, while the text on other crops has been amplified, e.g. *Papaver somniferum*, *Sinapis alba*, *Solanum tuberosum*, *Cichorium intybus* and *Helianthus annuus*.

There are several improvements upon earlier editions : a more detailed subdivision of the contents pages, maps which are kinder to the eye, a larger subject index, clearer type, better layout of figures, and short lists of references of fairly recent publications given at intervals throughout the book. The reviewer has learnt to regard this as an indispensable reference book and is therefore grateful for the revision of the text.—D. Brown.

1343† Klingman, G. C. **Crop production in the South,** 1957, pp. viii + 416, illus., 22 × 14·5 cm., London : Chapman and Hall, Ltd.; New York : John Wiley and Sons, Inc., Southern Fm Series, 40s.

This is a book primarily intended for " furthering the scientific training of young men studying agriculture " in the southern United States of America. The first third of the book contains a comprehensive account of the structure and physiology of crop plants, the effect of soils and fertilizers on plant growth, the improvement of crops by means of plant breeding, and the germination of seeds. This section of the book gives the impression of being rather unevenly written. It is over-simplified in many places, while the explanations given are not as accurately worded as one could wish. At times facts and terms are introduced without adequate explanation. Many of the illustrations could have been dispensed with. On the other hand, the remainder of the book forms a

well-written account of the practice and economics of crop production. The cultural and chemical control of weeds is described, and an extremely well-illustrated chapter on forage production includes a useful diagram (p. 171) showing the growth cycles of 18 different grasses and legumes at any time of the year and the recommended dates of sowing. Field crops for which cultural practices are described and explained include cotton, wheat, oats, barley, maize, sorghum, rice, groundnuts, soyabeans, cowpeas, potatoes, and sweet-potatoes. There is a good index.—R. Boyce.

1344† Bareš, M. and others. Praktická agrotechnika. [**The cultivation of farm crops.**] 1955, pp. 463, illus., 24 × 18 cm., Prague : Czeckosl. Acad. Agric. Sci. [Received March, 1958]

1345 Bates, W. N. **Mechanization of tropical crops.** 1957, pp. xiii + 410, bibl. 61, illus., 22 × 14·5 cm., London : Temple Press Ltd., and Farm Mechanization, 45s. [Received March, 1958]

" In this work the author records from practical experience the results obtained by crop mechanization under varying conditions, particularly those prevailing in the British Commonwealth." Part 1 is devoted to : a general discussion on the production of tropical food-crops in relation to climate ; tropical soils in relation to climate; soil erosion and conservation ; drainage and irrigation.

The more technical aspects of mechanization as related to conditions in the tropics are dealt with in Part 2. A chapter on the implements available for pest disease and weed control is included and one on technical education and the training of overseas personnel. In his introduction the author states " that only those machines and implements are recommended for use in a particular region or for a particular operation in the farming cycle which experience suggests are suitable for development for that region or operation. I do not infer by this that there may not be other machines that might be just as effective in attaining the required results."

The final section, which comprises more than half the book, gives more detailed accounts of the cultivation and mechanization of the main crops cultivated in the tropics. The crops include : rice, maize and other cereals, cassava, sweet-potatoes, yams, cocoyam, groundnuts, pulses and legumes, sesame, sunflower, cotton, jute, flax and miscellaneous fibre plants. There is also a short chapter on forage grasses.

The subject matter is well presented and throughout the book the emphasis is on the practical rather than the theoretical aspects of the subject. The book " is of value not only to the grower but also to manufacturers of plant and equipment " and one might add, it is of value to the amateur and the specialist in crop production. —M. Pennington.

1346† Norman, A. G. [Ed.] **Advances in agronomy. Vol. 9.** 1957, pp. xi + 308, bibl. at end of papers, illus., 23 × 15 cm., New York : Academic Press Inc., London : Academic Books Ltd.

Among papers contributed are the following : (1) Agricultural trends in the old cotton belt [in the USA]. By R. W. Pearson and J. H. Yeager ; (2) Zinc deficiency and its control. By W. Thorne ; (3) Defoliation and desiccation : harvest-aid practices. By F. T. Addicott and Ruth S. Lynch ; (4) The Lespedezas. By P. R. Henson and others ; (5) The contributions of statistics to agronomy. By O. Kempthorne.—M.P.

1347† Ruhland [Ed.] Handbuch der Pflanzenphysiologie. Vol. 8. Der Stickstoffumsatz. **Encyclopaedia of plant physiology. Vol. 8. Nitrogen metabolism.** 1958, pp. 1310, bibl., illus., 25 × 17 cm., Berlin-Göttingen-Heidelberg : Springer-Verlag, DM 286 [£24. 9s.].

This volume of the series on plant physiology, sub-edited by Professor K. Mothes of Halle/Saale, contains 44 contributions, some in German, others in English, by 34 plant scientists and chemists from East and West Germany, France, Sweden, Switzerland, Gt Britain, Burma, Australia, South Africa and the USA. The subject matter is presented in 11 parts : introduction ; source of N and its assimilation ; plant-proteins and peptides ; the protein turnover ; degradation of amino-acids ; ammonia detoxication and amino-group storage ; metabolism of compounds of the nucleus ; synthesis and metabolism of other N compounds ; breakdown of N compounds ; nitrification ; the geochemical importance of N with special reference to manuring. There are German-English and English-German subject indexes which serve as specialized dictionaries as well as guides to the text. Each paper has its own list of references and there is an author index.—D.B.

1348† Miller, A. A. **Climatology.** 8th edn, 1953, pp. x + 318, bibl. at end of chaps, illus., 22 × 14 cm., London : Methuen and Co. Ltd. ; New York : E. P. Dutton and Co. Inc.

In the eighth edition (now reprinted for the second time) of this book on climate, the rational and easily applied classification of climates put forward more than twenty years ago has been refined to bring it still more closely in line with the distribution of natural vegetation, which is regarded as the best single index of climatic unity and land-use potentialities. Within this framework regional varieties of climate are separately described and explained in a way that stresses climate as a geographical factor and its influence on the

way of life of the inhabitants. Special chapters are devoted to the use of the Air Mass concept in climatology, to the principles of classification and to the evolution of the climates of the present day. Monthly temperature and rainfall figures are provided for nearly 300 carefully selected stations.—C.L.S.

1349 LEE, D. H. K. **Climate and economic development in the tropics.** 1957, pp. xviii + 182, bibl. 57, illus., 22 × 15 cm., Council on Foreign Relations, USA; New York: Harper and Brothers.

This book aims at presenting a summary of present knowledge on the effect of tropical climate on crop production, animal husbandry, human health and efficiency, and industry. An enquiry into this subject was initiated by the Council on Foreign Relations (USA) who organized the Study Group on Climate and Economic Development and it is the discussions of this Group that the author has summarized.

He attempts to separate the direct effects of tropical climates on crops, domestic animals and the human population from indirect effects, such as the creation of a favourable environment for pathogens and pests. In a work of this size the treatment must necessarily be very generalized, but this is particularly apparent in the section on crops. The way in which non-climatic factors, such as systems of land tenure and social and religious customs, make recognition of the effects of climate difficult, and may hinder amelioration of these effects, is stressed throughout. The concluding remarks relate to the application of present knowledge and the topics deserving future attention.—A.M.H.

1350 SMITH, L. P. **Farming weather.** 1958, pp. vii + 208, illus., 21 × 14 cm., Edinburgh: Thomas Nelson and Sons Ltd., 15s.

Every agriculturist will welcome an authoritative book on the weather and its effects upon crop growth. If factors affecting crop production are divided into four main groups, latitude factors, climate factors, soil factors and biotic factors, it will be apparent that the last two are covered to a greater or lesser extent in numerous authoritative works. The first two groups are not so covered and the literature concerning them is dispersed and not easy of access to the agriculturist. Mr. Smith puts it "... the application of meteorological physics to the problems of agriculture is as important as the analysis of the soil chemist or the research of the plant breeder." Perhaps this is being too modest as latitude and climate are usually considered to be the dominant agronomic factors.

The aim of the book is to "... help the farmer to understand the weather and its effects so that he may gain more knowledge from his own experience and improve his judgement." This aim is achieved in a well presented and well balanced book written within the general context of the climate of the British Isles. It is well illustrated by maps, diagrams and contains numerous data tables. It is written in a very readable manner and is enlivened by a thread of light irony.

The book is divided into three parts which are entitled: The weather, The climate, The forecasts. The first deals with the day-to-day conditions at a particular place, their measurement and their agronomic effect, the second with the pattern of weather occurring throughout the British Isles from the point of view of temperature, humidity, sunshine, rainfall, wind, frost and long-term trends, the third with the development of low- and high-pressure weather patterns, the techniques of forecasts, self help with local forecasts, and weather lore.

Within the book will be found simple guidance to: the calculation of irrigation requirements; the positive and negative effects of temperature on growth; the influence of latitude on length of day and intensity of sunshine, together with much other material of interest to those engaged on crop production. Throughout the book emphasis is given to the limited value of "averages" without consideration of "range."

Three criticisms may be made of this otherwise most useful book. The first is that one would have liked to have seen rather more emphasis on the agronomic effects of climate. For instance, in the account of accumulated temperature, the base temperature of 42°F. is used throughout. There is evidence to show that 35°F., 40°F. and 50°F. are appropriate for different types of crops. A second criticism is that one would have liked to have seen a more comprehensive set of meteorological-data tables inserted as appendices. The third criticism is the lack of key references to further information. Mr. Smith will have whetted the appetite of many of his readers for further information; the presence of a list of key references would have been an aid to its satisfaction and would have improved the book for the university student.

In spite of these criticisms the book is well written, packed with information, well indexed and is one which every agriculturist should have on his shelves.—R. Holliday.

1351† RICHHARIA, R. H. **Plant breeding and genetics in India. Vol. 1.** 2nd edn, 1957, pp. vii + 410, bibl. at end of chaps + 71, plant index, illus., 23 × 14 cm., Patna, India: Scientific Book Co., 30s.

See *Pl. Breed. Abstr.* 17: p. 347.

1352† MCCONNELL, Primrose. **The agricultural notebook.** 13th edn [revised and ed. by

H. I. Moore], 1958, pp. xv + 846, illus., 16 × 11 cm., London : Farmer and Stockbreeder Publs Ltd., 40s.

This 13th edition, the second edition to be entirely rewritten and re-set since 1952, has been enlarged under the editorship of Prof. H. Ian Moore, with contributions from a team of authorities.—C.L.S.

NEWS ITEMS AND NOTES

Netherlands

1353† Weed Control. To forestall an invasion of weeds on the newly-reclaimed East Flevoland polder, seeds of *Phragmites communis* (the Norfolk reed) were sown from the air. The plants can be eradicated later by lowering the water-table. *Fmr's Wkly, Lond.* 18 April 1958.—C.L.S.

Italy

1354 Rice-Growing near Rome on a 223-ha. farm is described ; an area where rice is an unusual crop. When purchased in 1953 the land (clay soil) was derelict. The whole of the farm is now irrigated with water derived from the Tiber through the canal of Porto and Maccarese. Rice, grown on 165 ha., yields about 6000 kg. (rough rice)/ha., almost all of which is sold for seed in northern Italy. Rice seed (as well as wheat seed) produced in central-southern Italy is thought to be better (higher germination energy, etc.) than that produced in the north. Although under irrigation the soil has lost its original salinity to a great extent and has become suitable for other crops, it is intended to continue growing rice in a suitable rotation. *G. Agric. Domen.* 1958, **68**, No. 2.—E.B.O.

USSR

1355 Zemledelie (*Agriculture, USSR*). The February, 1958, issue of this journal (published by the USSR Ministry of Agriculture) contains popular articles classified as follows : (1) *Crop rotations* : Rotations in the rice areas of the Kuban, by E. B. Veličko ; Rotations in collective farms of the Jaroslav Province, by I. I. Pečenin ; (2) *Cultural measures for different crops* : Cultivating spring wheat in the South-East, by P. M. Fokeev ; Grain crops on bog-peat soils, by S. I. Trizno ; Sowings of herbage plants under cover crops in the humid zone of Azerbaĭdžan, by Š. G. Samedov ; (3) *Seed treatment* : Molybdenum – an effective agent for increasing yields of leguminous crops, by B. M. Nekljudov ; and Accelerating the ripening of spring vetch seed, by M. P. Kozak [see Abs. 1097].—M.H.

India

1356 Japanese Method of Paddy Cultivation in Vidarbha. An intensive campaign for popularizing the Japanese method was begun in this area in 1953–4 by means of demonstration plots and films. In 1954–5 its encouragement was part of the Grow More Food Campaign and assistance was given to farmers by distributing the intercultural implement " touchi gurmas ". Since 1956–7 the Japanese method has been part of the Second [Five-Year] Plan. During the 4 growing seasons 1953–4 to 1956–7 the acreage grown by the Japanese method has increased from 717 to 24,593. This is out of a total of 1,090,000 ac. (500,000 of which are irrigated) under rice in Vidarbha. By the local method, yields are 1640 lb./ac., by the Japanese method about 3,000. *Farmer, Bombay* Jan. 1958.—D.B.

Argentina

1357 Agricultural Production and Improvement. Information, including crop areas, varieties and yields, is given on the principal crops of Argentina (cereals, flax, sugar-beet, cotton, groundnuts, soyabean, sesame, sunflower and forage crops) in *Bol. Prod. Fom. agric., B. Aires* 1955, **7**, No. 61–6.—E.B.O.

International

1358 The 9th International Botanical Congress will be held in Montreal, Canada, from 19 to 29 Aug., 1959, at the McGill University and the University of Montreal, and will be preceded by sessions of the Bureau of Nomenclature from 16 to 19 Aug. Further information can be obtained from : The Secretary-General, 9th International Botanical Congress, Science Service Building, Ottawa, Canada.

Bibliographies

1359 The Bureau has received bibliographies (references cited in various languages) from the Centrum voor Landbouwdocumentatie, Wageningen, on the following subjects:

Soil erosion by wind.
Shifting cultivation in tropical countries.
Foliar application of urea.
Control of weeds in winter cereals.

New Publications

1360 Digest of Agricultural Economics. This quarterly publication, the first number of which appeared in September 1957, aims at covering all reports of research and studies on the subject published in Great Britain and such overseas work as might be useful to those concerned with British agricultural economic problems. In the first two numbers, recent work is dealt with under headings which include : economic aspects of farm organization and enterprises ; land use ; demand for agricultural products ; factors of production ; agricultural policy ; research methods and techniques.—A.M.H.

1361† Span – Shell Public Health and Agricultural News. This is the new title of the former Shell Agricultural News and denotes the wider field which the journal will now cover. In future, contributions will not be limited to those from the Royal Dutch/Shell Group. *Span* No. 1, April 1958, includes articles on the use of radioactive materials in agriculture, the dangers of agricultural chemicals, and spraying by helicopter in New Zealand.—A.M.H.

1362 The Indexer (Journal of the Society of Indexers). This journal began publication in March, 1958, and is the official journal of the Society of Indexers founded in London in 1957. Its aim is to bring together indexing problems encountered and also suggestions for achieving uniformity in indexing technique. Enquiries should be addressed to : Hon. Secretary, 3 Western Mansions, Western Parade, Barnet, Herts.—J.M.H.

Enquiries received

1363 Arising from enquiries received and answered by the Bureau from March to May 1958, a bibliography was prepared on : Wheat : changes in distribution of nitrogen in various plant parts during growth and development.